The Electrical Industry's Weekly Magazine

March 13, 1961

Electrical World

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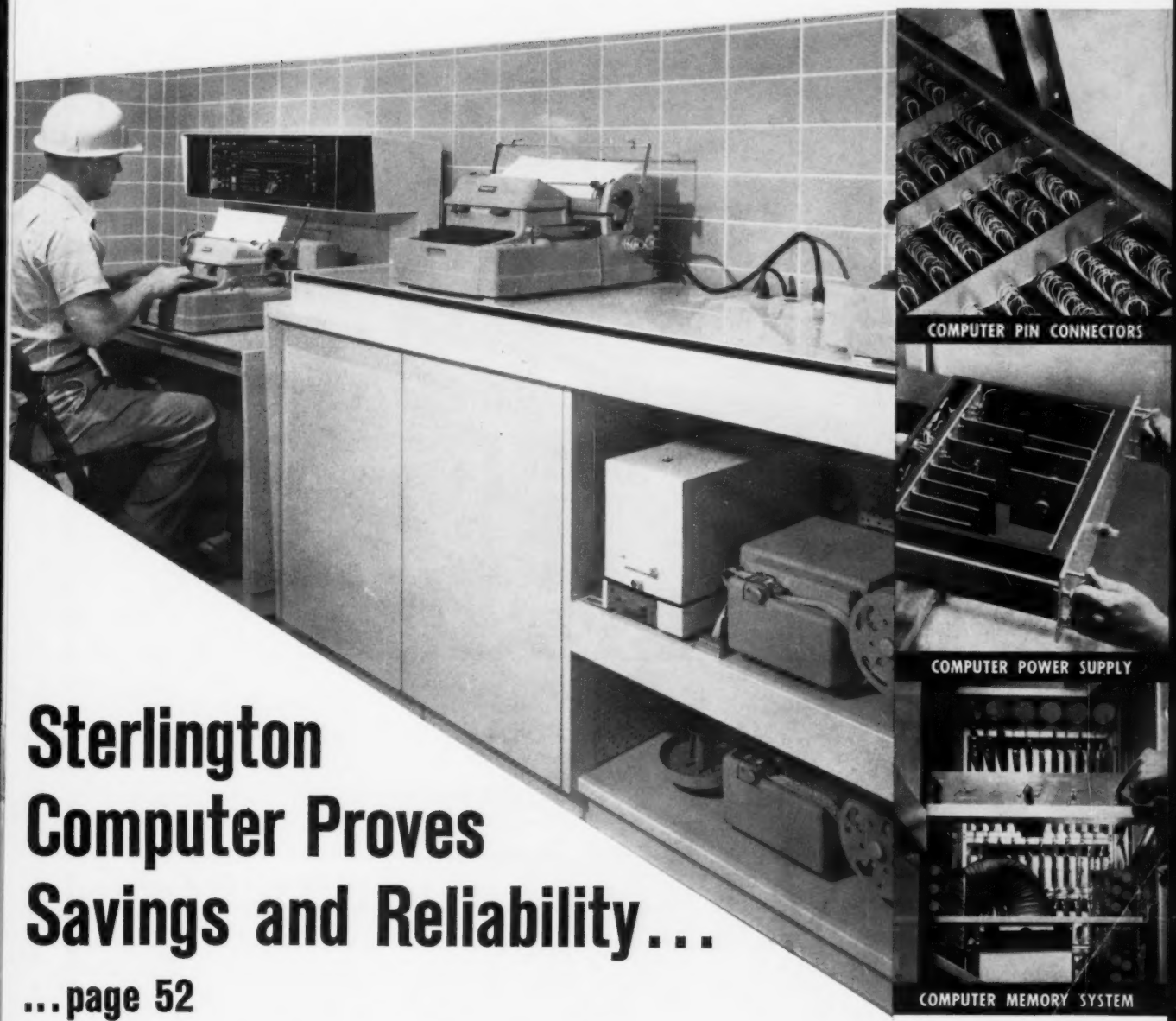

COMPUTER PIN CONNECTORS

COMPUTER POWER SUPPLY

COMPUTER MEMORY SYSTEM

Sterlington Computer Proves Savings and Reliability...

...page 52

Ken Holum gives his views on powe

...page 44

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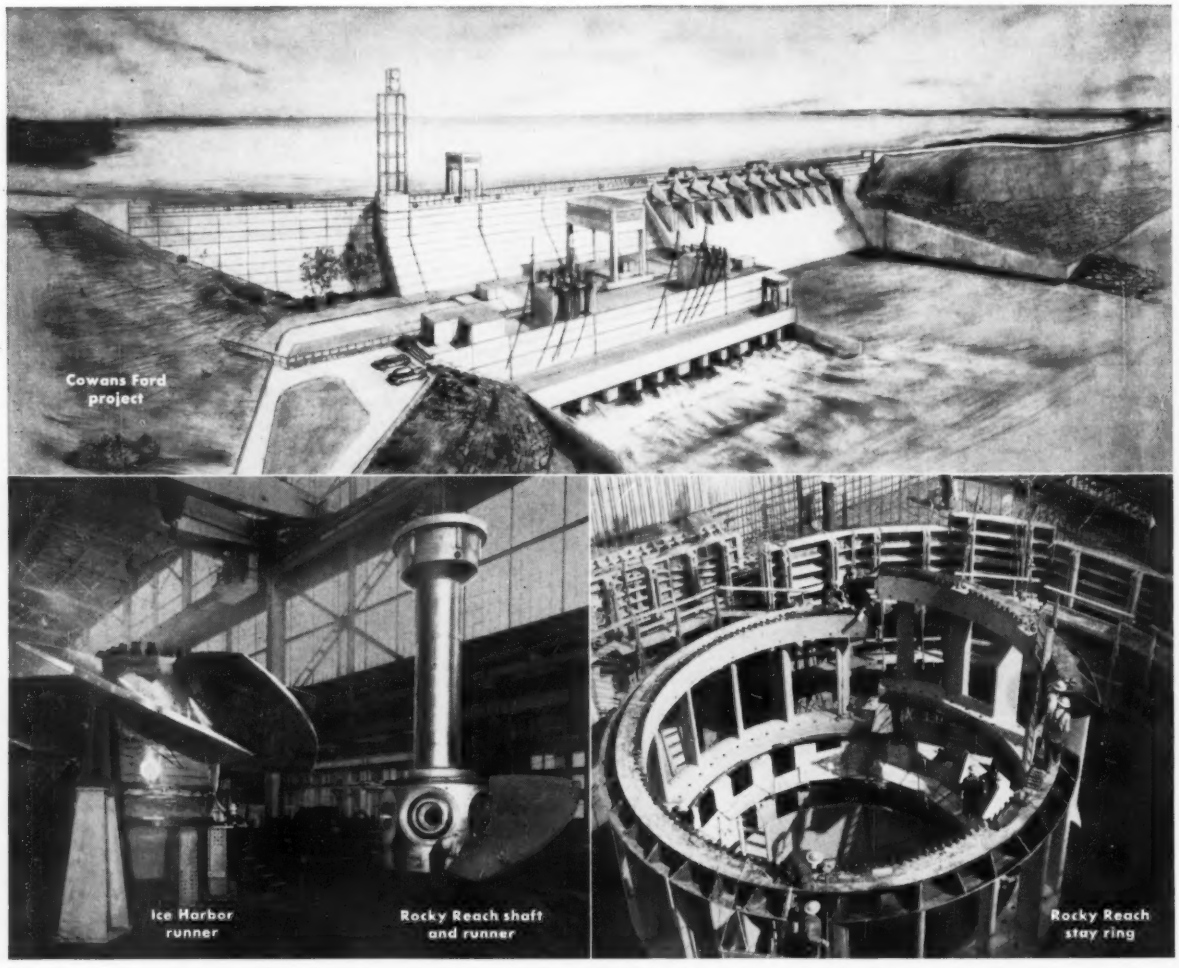

high-head Kaplans for peaking

—previous record-breakers also by Allis-Chalmers

Cowans Ford is the outstanding illustration of Kaplan turbines used to provide peaking capacity. Duke Power Company, with Chas. T. Main Inc. as consulting engineers, has selected A-C Kaplan turbines for operation at 115-ft. head. Each of the three units is guaranteed to provide a maximum of 153,000 hp. Actual operation will involve only a short time each day, meeting peaking requirements of the system which is predominantly steam. The resulting average load factor, *less than 5%*.

KAPLAN RECORD-BREAKERS

Cowans Ford — the third in a series of outstanding A-C Kaplan turbine installations. These units exceed those at both Ice Harbor and Rocky Reach in rated capacity and head. All are similar in construction (those at Cowans Ford are slightly smaller in physical size). Allis-Chalmers diversified experience to date includes over 240 Kaplan turbines — *a record 6 million hp.*

Rocky Reach—public utility district supplied with seven Kaplan turbines, each 140,000 hp (under 92-ft. head).

Ice Harbor — Corps of Engineers installation recently provided with three new A-C Kaplans for operation at 89-ft. head. These held the record with 143,000 hp per turbine until Cowans Ford.

In every facet of hydro generation, people count on record performance and experience from Allis-Chalmers. For assistance anytime, contact your local A-C representative or write to **Allis-Chalmers,** Hydraulic Division, York, Pa.

A-1383

Published for 87 years for those engaged in the business of generating, transmitting, distributing, or applying electric power

Electrical World

March 13, 1961

Vol. 155, No. 11

Electrical What in the World . . .

There aren't many subjects we've touched on in this column which seem of greater importance to us than the need to pre-sell engineering students on utility engineering as a vibrant, satisfying career. So it is very satisfying to be able to point to a successful effort along these lines.

At a recent meeting of the Pennsylvania Electric Assn's System Planning Committee in Philadelphia, invitations to a dinner meeting were extended to professors of electrical engineering in the Philadelphia area. The professors were urged to bring some of their top senior and graduate students.

At the meeting, experienced system planners took a crack at some of the "new frontiers" of utility engineering—the challenges to a creative engineer on hand or just around the corner. Exotic fuel sources, computer uses, interconnection and bulk transmission problems were discussed, with imagination given free rein. For many students and professors it was the first demonstration that stimulating engineering challenges remain in utilities. And committee members and guests got a fresh look at a suddenly not-so-familiar industry.

The idea is not unique. But it is a solid example of grass-roots missionary work which can help bridge the gap of misunderstanding between the electronics-oriented student and our industry. These smaller meetings (about 25 professors and students and 35 committee members and guests attended this one) provide the best opportunity to spread the word. *Electrical World* congratulates the PEA and its System Planning Committee.

Chuck Hochgesang

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NOW... a small, light, easy-to-install plastic control cable...

OKONITE P-30

small diameter plastic control cable

SMALL-CABLE SIZE, BIG-CABLE PERFORMANCE. That's the story on Okonite's new P-30—the multiple conductor cable designed especially for modern control systems where space is limited. Suitable for either a-c or d-c circuits, 600-volt rating, it's recommended for d-c circuits in wet locations and for temperature ranges to 75C. Rugged Okoseal jacket is moisture and flame resistant, provides a smooth surface for easy pulling.

Bare Annealed Copper
20-mil Okolene (polyethylene)
10-mil Color Coded Okoseal (polyvinylchloride compound)
Clear Mylar Tape
Protective Covering of Okoseal (polyvinylchloride compound)

To meet the trend toward lighter, more compact control systems in industry and utilities, Okonite now introduces P-30, a superior quality, small diameter, all-thermoplastic control cable. It's an ideal lightweight, general purpose cable for all types of installations—conduit, aerial, duct, tray, direct burial . . . in wet or dry locations.

Over 30% smaller and lighter than conventional-size rubber cables, Okonite P-30 nevertheless provides the kind of performance normally associated with many larger diameter cables. The multi-wall construction of P-30 offers three-fold electrical protection, since both the two protective coverings and the basic insulation are high quality dielectrics.

P-30 is especially suited for use under rigorous conditions. Double-wall construction provides excellent resistance to the chemical attacks of oils, acids, alkalies and other materials. The protective jacket of Okoseal—extruded over the cable assembly—assures a moisture- and flame-resistant covering.

Another example of Okonite *Cable'bility** in action . . . P-30 is designed to give years of trouble-free service on vital installations. For complete details, write for Bulletin 1140, The Okonite Company, Subsidiary of Kennecott Copper Corporation, Dept. EW, Passaic, New Jersey. 7933

*Okonite Cable'bility... Cable Craftsmanship since 1878.

where there's electrical power . . . there's

OKONITE CABLE

Letters

Draftsman Does Diving

To the Editor:

It was a pleasure to see on the cover of the Feb. 13 issue an artist's interpretation of our successful string shooting.

We used skin divers rather than a conventional diver as shown. One of our draftsmen who is an amateur skin diver has been doing all inspections.

P. A. Duchastel, Chief Engineer,
Quebec Power Co

Who Tests the Tester?

To the Editor:

Having read the Management Newsletter in the *Electrical World* of Feb. 6, 1961, under the title, "Psychological Tests—Tool or Trap?" two questions come to mind. Who tests the officers and personnel of Psychological Corporation? Who tests the tests provided by Psychological Corporation in order to determine whether or not these tests are testing those tested accurately and whether or not tests can be devised to test still more searchingly?

Secretary, The Continental Insurance Co
80 Maiden Lane, New York 5, N. Y.

▶ Psychological Corp tests all applicants for professional and clerical positions within the company. All its tests are accompanied by a manual which outlines the research supporting the tests' validity and reliability.

Peak Crosses Mason-Dixon Line

To the Editor:

In the annual winter peak survey (EW, Feb. 6, p 38) the item "% Over 1960 Summer Peak" shown for the Hartford Electric Light Co is −38.1. This makes our company a runner-up to New Orleans Public Service Co for summer peak honors. Much as we would appreciate being moved South during this old fashionist of winters, we are still snow-burdened Connecticut Yankees and the correct figure is +8.1%.

E. C. Brown, Assistant to the President,
Hartford Electric Light Co, Wethersfield, Conn.

Dateline . . .

Dallas—The nearly 7,200 rural electric cooperative officials and their wives who milled about this sun-kissed city for the 19th annual National Rural Electric Cooperative Assn Convention lent an extra touch of color and carried plenty on their minds that wasn't mirrored on the official program.

Delegates superimposed their own state symbols over the rather elaborate nametags that were furnished by NRECA. Iowans displayed a yellow corn ear with the inscription "Tall Corn State" on their sagging lapels. North Carolinians wore cardboard "footprints" with black heels to symbolize the "Tar Heel State." And the Wisconsin contingent wore huge round badges boosting the "Dairy State." There was a certain pride in wearing the state symbols just as there was in the rural electric co-op insignias.

If you watched closely, you would notice that the great majority of the rural co-op directors were in their late fifties and in their sixties. There just weren't many young directors. Managers and lawyers were generally younger and more dapper.

Most of the directors were with the co-ops in the early years of the rural co-op movement and vividly recalled their struggles in getting together the first few hundred dollars and screwing up enough courage to send in their first loan application. "Sure," said one Midwest director, "I made the calls around my area and talked with the other farmers. I had to get $25 from each family and I'll tell you some of them didn't want to let go of $25 back in the Thirties. But the power company had wanted to charge us $200 or $300 for connecting up our houses."

The older men appeared to enjoy reminiscing—telling about that first night when the lights went on, the battles with the power company, the troubles of the young rural electric co-ops. But even as they

(*Continued on page* 49)

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The American Hot Dip
Galvanizers Association
with the cooperation of
The American Zinc Institute
Announces the $10,000.

Galvanizers' International

Ten Awards of $1,000. Each

Ten awards are to be made to entrants selected by the judges. Each award will consist of $1,000 in cash, a suitable medal and a Certificate of Achievement.

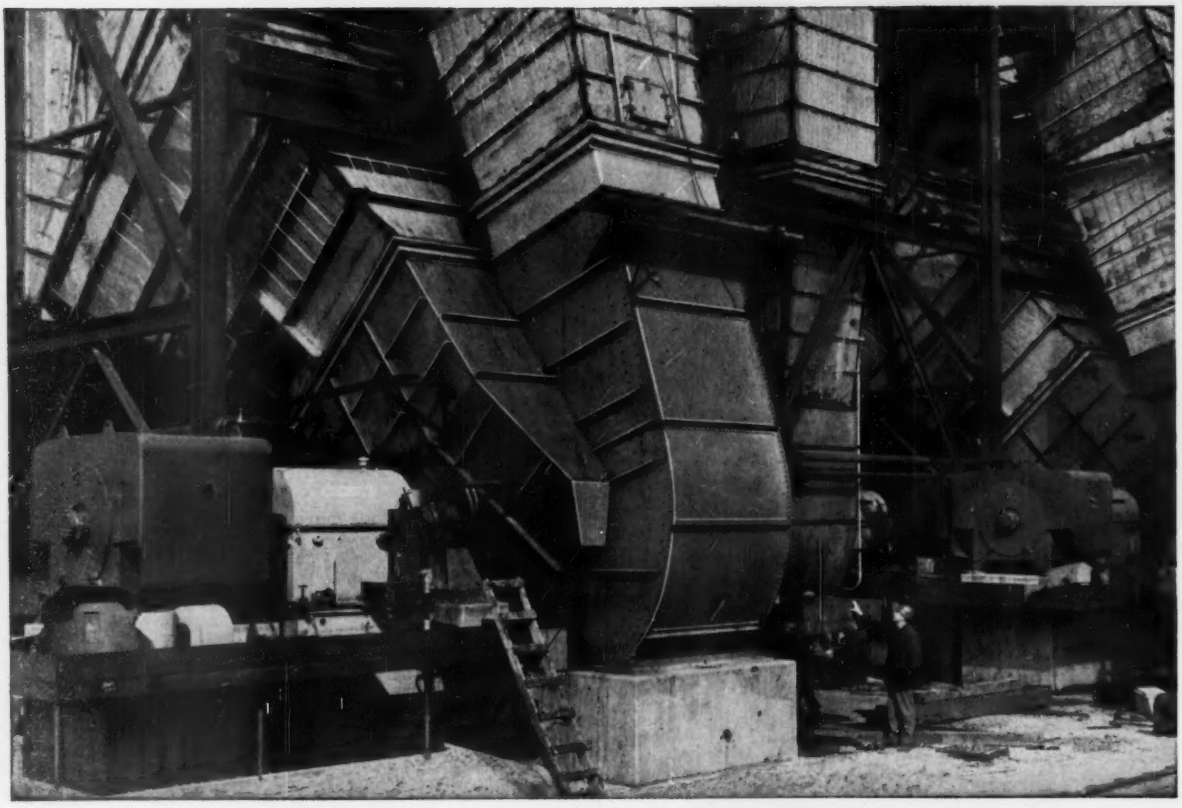
This is not a contest—it is a search for new ideas. ■ *Your entry, therefore,* will not be judged against others, but solely on its merit and value in developing new applications and markets for Hot Dip Galvanizing. ■ If your idea, in the opinion of the judges, is of practical value to the industry, you will be cited for an award—promptly. ■ Because the Hot Dip Galvanizing Industry is anxious to receive ideas of this type, the judges reserve the right to present *more* than 10 awards, if the entries warrant.

CONDITIONS ■ Anyone in the world (except members of the American Hot Dip Galvanizers Association and the American Zinc Institute, and their employees and advertising agencies) may submit one or more entries. ■ Entries will be considered by the judges promptly upon their receipt. No entry received after April 30, 1962 will be considered. ■ The Awards will be made for ideas pertaining to: (a) Applications of Hot Dip Galvanizing to a *new or unusual* field, or; (b) An *improvement* in application in fields where Hot Dip Galvanizing is now being used, or; (c) New methods of *after-treatments* of Hot Dip Galvanized products. ■ Each entry submitted must contain: (a) Description and documentation of application. (b) Case history of the application or process accompanied by photo, drawings, formulae, etc. (c) All technical data needed for the utilization of the idea submitted. (d) Release of the application or idea for general use without payment or royalty other than the $1000 award. ■ The decision of the judges will be final. Award-winning ideas will be retained by the American Hot Dip Galvanizers Association for dissemination throughout industry. Other entries will be returned. ■ No formal entry blank is required but the entry should be accompanied by the name, address and business connection of the individual submitting it. Business firms or corporations may submit entries under their business name, instead of as individuals, if they choose to do so. ■ Entries should be sent to: AMERICAN HOT DIP GALVANIZERS ASSOCIATION, INC., 5225 Manning Place, N.W., Washington 16, D. C. ■ *Note:* For information on galvanizing write to the above address for name and location of the American Hot Dip Galvanizers Association member nearest you.

Awards

FOR ACHIEVEMENTS IN RESEARCH, DEVELOPMENT AND UTILIZATION OF GALVANIZED PRODUCTS

THE JUDGES ■ Dr. Clarence H. Lorig, Technical Director, Battelle Memorial Institute and Past President American Society for Metals. ■ Mr. John R. Daesen, Technical Director, American Hot Dip Galvanizers Association. ■ Mr. John L. Kimberley, Executive Vice President, American Zinc Institute.



LOOKING FOR PEAK EFFICIENCY OVER BROAD RANGE FOR YOUR DRAFT FANS?

Here's Why "Buffalo" "BLH" is Best Answer:

The "Buffalo" Family of "BLH" Fans is designed for highest mechanical efficiency over an extremely broad operating range. Rugged "Buffalo" construction insures economical, dependable operation throughout a long, trouble-free life.

"Buffalo" Type "BLH" features include: streamlined housing designed to deliver ultra-smooth air flow, peak static conversion and pressure distribution at outlet — turbulence minimized by smooth inlet bell, directional inlet vanes, backward-curved blades, matching rotor flange and inlet bell and gradually divergent outlet. These features all add up to the quiet, powerful, smooth performance characteristic of the "BLH".

Reliable, maintenance-free operation is the result of extra-heavy construction throughout. This includes sturdy steel plate construction ruggedly welded for extra strength — oversized shafts and bearings. Rotors are statically and dynamically machine balanced at factory.

If your mechanical draft conditions require a dependable fan that provides high efficiency over a broad operating range, ask your "Buffalo" engineering representative for complete facts about the "Buffalo" family of mechanical draft fans. Or you can write us direct for Bulletin FD-905.

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'Buffalo' Air Handling Equipment to move, heat, cool, dehumidify and clean air and other gases.

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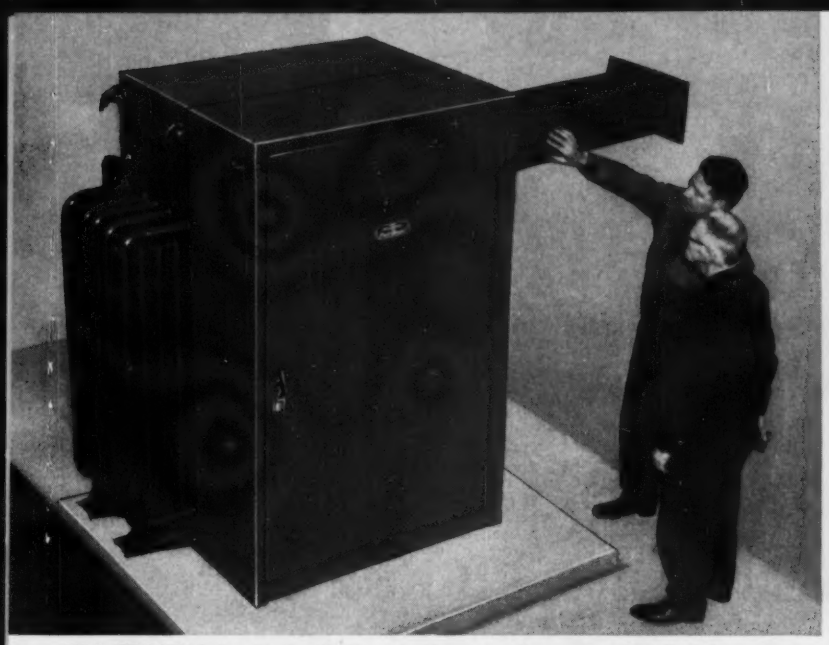
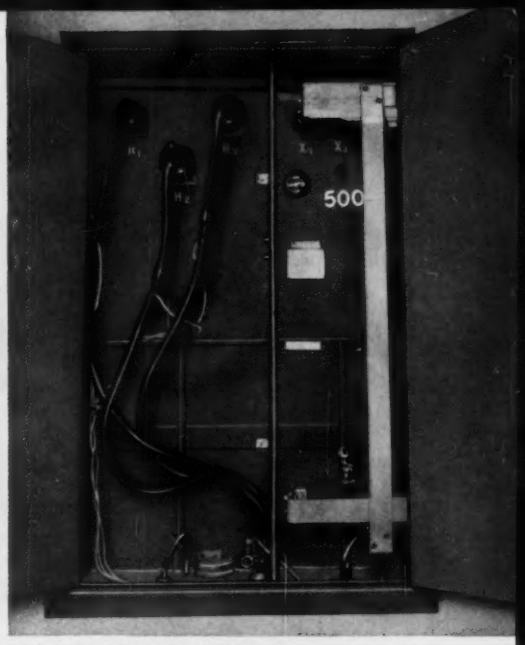


KENNETH HILLS (back), Pacific Electric Company, Bremerton, installed the unique bus and duct, which he is showing to L. E. Hill, Asst. Supt., Western Division, Puget Sound Power & Light Company. The power company installed the L-M Pad-Mount transformer. Coast Electric & Manufacturing Co. made the bus and duct.



PRIMARY COMPARTMENT (left) can be locked and still permit access to secondary compartment, right. Short 4-foot bus connected to switch panel cuts secondary voltage drop.

NEW WESTBAY SHOPPING CENTER, Port Orchard, Washington. Power service is led underground to the Pad-Mount transformer from the pole at the right, which carries fuse cutouts and lightning arresters. Alexander H. Hargis designed the underground system and engineered the entire shopping center.

L-M's Pad-Mount© Transformer Maintains Voltage For West Coast Shopping Center

Unique design provides short 4-foot bus to switch panel, maintenance-free duct connection at Port Orchard, Washington shopping center.

Secondary voltage drop in incoming service is reduced by unique bus design in the L-M Pad-Mount transformer installation at Westbay Shopping Center, Port Orchard, Wash.

Separate primary and secondary cabinets in the Pad-Mount transformer simplify installation and provide flexibility for future transformer changes. Tamper-proof construction with no accessibility to live parts assures maximum safety for shoppers and children. The compact design and neat appearance make the transformer unobtrusive.

Installation Data

Primary

Type of circuit . . . . . radial
Pad-Mount transformer rating, 12470Y/7200 volts, 500 kva

Secondary

Type of circuit . . . . . four-wire
Voltage, volts 208Y/120
Type of load . . . . . commercial

OUR 50TH YEAR 1911 — 1961

LINE MATERIAL® Industries

McGRAW-EDISON COMPANY

503

Transformers

McGRAW EDISON

DISTRIBUTION TRANSFORMERS • RECLOSERS, SECTIONALIZERS AND OIL SWITCHES • FUSE CUTOUTS AND FUSE LINKS • LIGHTNING ARRESTERS • POWER SWITCHING EQUIPMENT
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Save on construction costs with the new '61 FORD TRUCKS

SAVE FROM $22 TO $260 ON PRICE* ALONE WITH FORD'S ECONOLINE PICKUP

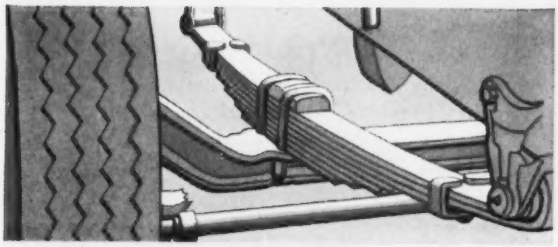
Profit-conscious contractors are finding it's good business to do business with the new Ford Econoline Pickup. It's America's lowest-priced* ½-tonner—bar none! Priced from $22 to $260 below conventional pickups. But that's just the beginning! You get lively performance and proven gas economy with the popular 144 cubic inch Falcon Six. This modern engine goes 4,000 miles between oil changes, and has an aluminized muffler which lasts up to three times as long as ordinary mufflers.

And you can save more because Ford's functional design has pared away 1,000 pounds of dead weight, yet you still get the payload capacity of standard ½-tonners. The big 7-foot box provides a whopping 73 cubic feet of loadspace . . . that's up to 23% more than conventional 6½-foot pickups. A full 49-inch tailgate opening means you can load items like standard sheets of 4′ by 8′ plywood. And the full-length *flat* floor permits bulky or heavy loads to be positioned easily by sliding them anywhere in the pickup box.

And you can save on maintenance expense, too. The engine cover can be lifted quickly, exposing the entire engine for rapid service. Spark plugs, distributor, etc., are conveniently located to speed engine tune-ups. And many major repairs can be made without ever removing the engine. One-piece cab-and-body construction provides increased rigidity and eliminates a major source of rust. In addition, all main underbody structural members are heavily zinc-coated to resist rust and corrosion.

New Ford Econoline ½-ton Pickup. Big 7-foot box with flat floor and 73 cu. ft. of usable loadspace. 1,650-lb. payloads with 4,350-lb. maximum GVW.

*Based on a comparison of latest available manufacturers' suggested retail delivered prices



SAVE UP TO $250 ON FRONT TIRES! In certified tests of two-ton truck suspensions, Ford front tires lasted over twice as long. In 40,000 miles this saving can add up to $250 . . . more as the mileage increases. And Ford's sturdy I-Beam front axle and leaf-spring suspension not only cut tire wear, but their simpler design also cuts maintenance costs.

12,000 MILE OR 12 MONTH WARRANTY

SAVE WITH GREATER DURABILITY . . . on all 1961 Ford Trucks, each part, except tires and tubes, is now warranted by your dealer against defects in material and workmanship for 12 months or 12,000 miles, whichever occurs first. The warranty does not apply, of course, to normal maintenance service and to the replacement in normal maintenance of parts such as filters, spark plugs and ignition points. Never before have you had such protection . . . such evidence of long-term economy!

SAVE WITH FORD'S NEW 262-CU. IN. "BIG SIX" ALL-TRUCK ENGINE FOR TOP PERFORMANCE AND ECONOMY

America's lowest-priced* medium-duty tilt-cab models now offer a big 262-cubic-inch Six with the power of big displacement, the gas economy of 6-cylinder design, plus the durability of heavy-duty construction. This engine features a sturdy stress-relieved head and block, strong forged steel crankshaft, long-lasting stellite-faced intake and exhaust valves and durable pyramid-type connecting rods. Positive Crankcase Ventilation reduces oil dilution and sludge formation to extend engine life. Ford's proven 292 V-8 and 292 HD V-8—the V-8's with "six-like" economy—are also available for your special power needs.

The popular Ford Tilt Cab Series outsells all other makes and for good reason! Their compact 82-inch BBC permits longer bodies within a given over-all length . . . for longer loads of lumber and building materials with excellent maneuverability. And set-back front axle design means more weight is carried on the front axle for greater payloads.

You also save with other new features like the stronger radiator with new lock-seam construction, and color-coded printed instrument panel electrical circuits that provide for greater reliability and simplified maintenance. In addition, Ford's parallel ladder-type frame, with standard 34-inch width, allows you to install new or transfer your present special construction bodies quicker and for less.

FORD TRUCKS COST LESS

YOUR FORD DEALER'S "CERTIFIED ECONOMY BOOK" PROVES IT FOR SURE...

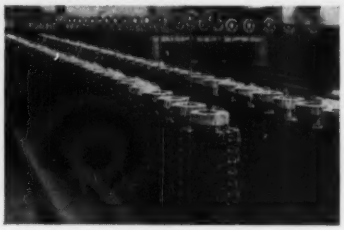
FORD DIVISION, *Ford Motor Company*

Exclusive Lapp Process Stabilizes Power Factor and Loss in Post Insulators

A LAPP LABORATORY REPORT

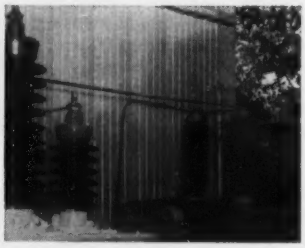
THE PROBLEM: Line Post and Station Post insulators occasionally have been found to show variation in power factor, charging current and watts loss under Doble tests. Field service seems not to have been impaired, but the phenomenon has been noticeable in such instances as erratic readings secured in tests of bushings connected to Post insulators.

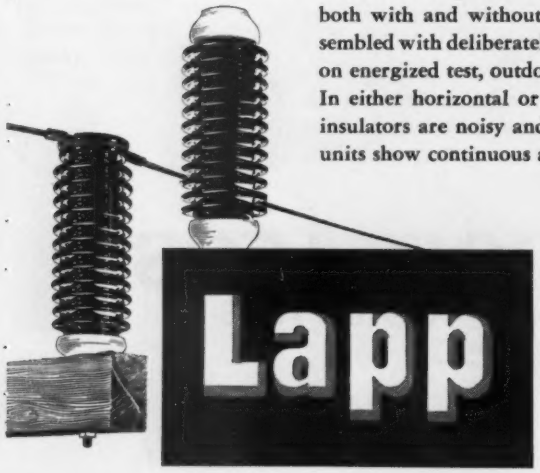
THE FINDING: Some years ago engineers of the Lapp Laboratory staff were assigned the job of tracing down the cause of such variations. It was located and identified as contamination deposits on the inside walls of the insulators. Porcelain bodies for Lapp Post insulators are subjected to a severe test for electrical soundness—a 3-minute flashover from the inside of the head around the body to the outside of the head. During this test the hole in the insulator fills with corona, and contaminating particles deposit on the walls of the hole; amount of this deposit and its effect on electrical characteristics vary with atmospheric conditions at the time of the test and at the time of plugging the hole for assembly.



THE SOLUTION: A thin coating of silicone applied to the wall of the insulator hole negates the effect of the corona contamination, and results in insulators dependably uniform in power factor, charging current and watts loss. Permanent effectiveness of the silicone coating is assured by its inherent chemical stability, and by the fact that the hole to which it is applied is sealed by the Lapp plug against weather, light, heat, or other physical or electrical attack. A Lapp patent is pending on the process.

THE VERIFICATION: All Lapp Line Post and Station Post insulator production for more than three years has incorporated the silicone treatment. The low initial power factor of the insulator has been maintained on every unit re-tested after service. In addition, in an effort to determine limits of effectiveness of the process, a series of insulators has been set up in the Lapp laboratory. Post insulators, both with and without the silicone treatment, were assembled with deliberately-defective plugs. They have been on energized test, outdoors, continuously for three years. In either horizontal or vertical mounting, all untreated insulators are noisy and show high loss. Silicone-treated units show continuous and unchanging low loss.





THE CONCLUSION: To the widely-known advantages, in electrical and physical performance, of its Post insulators, Lapp research has added the characteristic of stability in power factor, charging current and watts loss. *At Lapp, insulator design and production is a matter of continuous development and improvement.*

Lapp Insulator Co., Inc., Le Roy, N. Y.

Jaybird Powerhouse and Camino Dam, recently completed as part of Sacramento Municipal Utility District's Upper American River Power Project. Engineering design and construction supervision by Bechtel; powerhouse and penstock construction by Pacific Bridge, dam by Gibbons and Reed.

Bechtel Experience at Work:

HYDRO

Direct experience with hydroelectric and water projects covers more than a third of a century, including a major role in the construction of Hoover Dam by Six Companies Inc.

Projects designed in the past several years have a constructed value of $400 million. Nearly two million kilowatts is presently under design for future construction.

Bechtel also provides every required service under single responsibility in steam and nuclear power.

BECHTEL CORPORATION

Engineers and Builders for Industry

SAN FRANCISCO • Los Angeles • New York • Houston

Canadian Bechtel Limited

TORONTO • Montreal • Calgary • Vancouver

BECHTEL

UNECONOMICAL LOAD TURNS SIGNAL LIGHT ON

Now—Westinghouse TL load indicators for 10 through 50 kva transformers

simplify system load management . . . fit 90% of existing transformers

Why wait for a voltage complaint to tell you about excessive overload?

Hook up a new Westinghouse TL load indicator right on the outside of the transformer.

Then when there's an economically significant overload, the signal light turns red. (A brief peak overload *doesn't* turn the light on.)

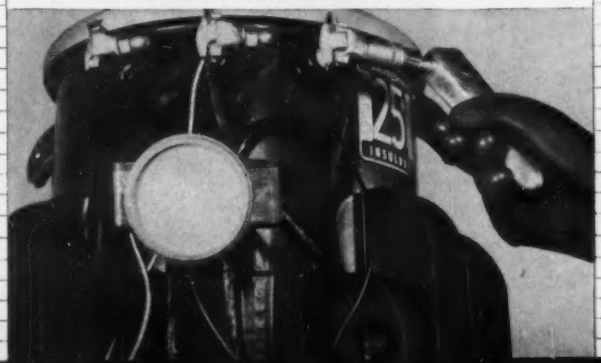
Who determines what overload is excessive? *You* do. The Westinghouse TL load indicator comes calibrated for recommended transformer loadings. But you can set the overload limit higher or lower.

Cost? $10 if you install it. When you buy a new Westinghouse transformer, a TL indicator, factory-installed, costs only $6.

Using Westinghouse TL load indicators, you change out your transformers at the most economical point. There's a model to fit every pole-type transformer, 10 through 50 kva, made since 1935. They give you the simplest, cheapest way yet devised to keep a check on your non-CSP transformers, and manage your system with practically no transformer overload problems.

Your Westinghouse sales representative has complete technical details. You can be sure . . . if it's Westinghouse. J-70952

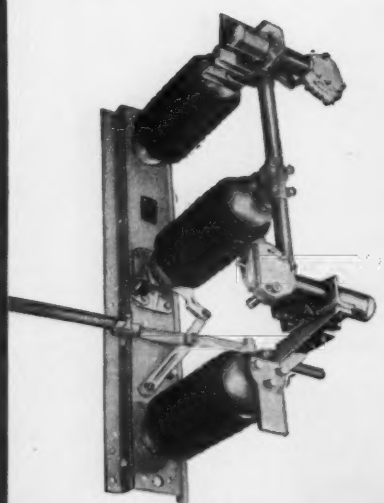
Westinghouse TL load indicator installs with simple hand tools in minutes. No internal connections.



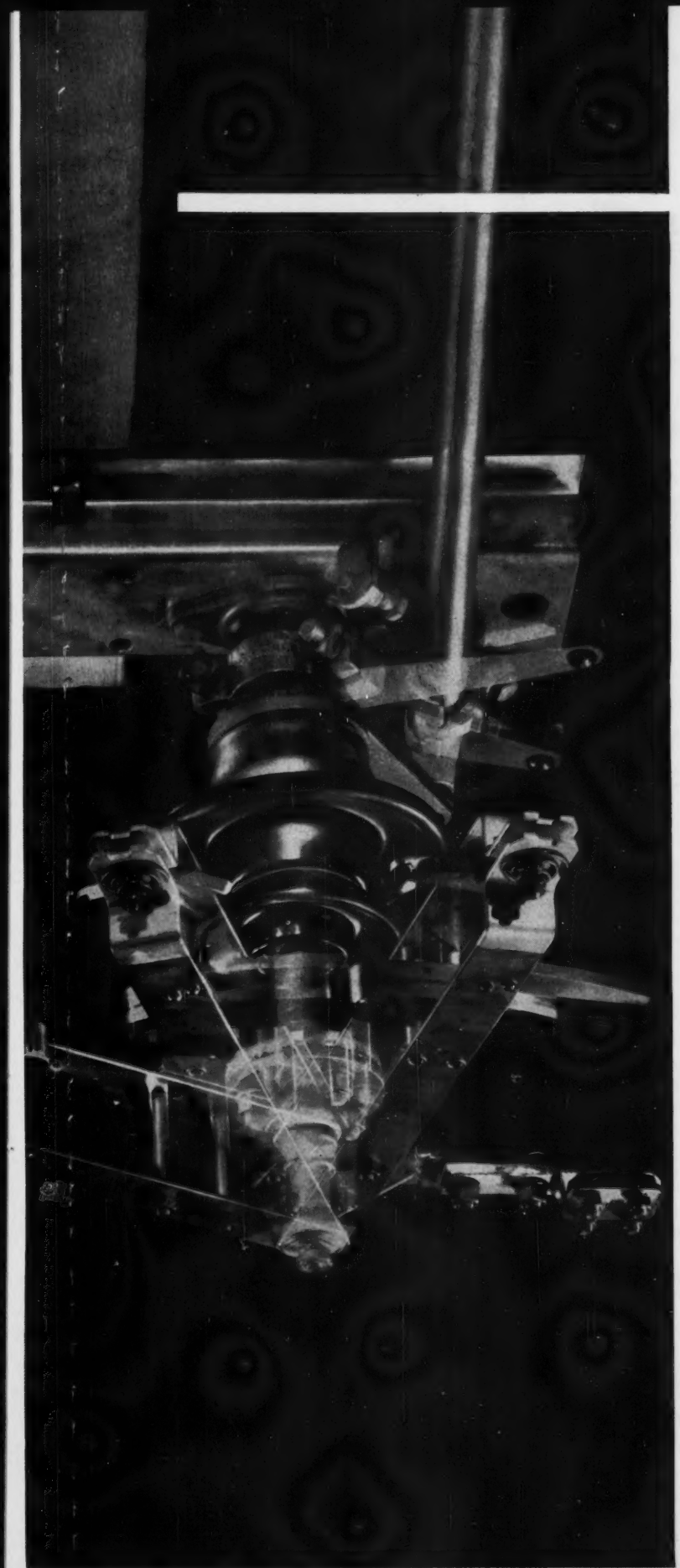
Westinghouse

SPLIT THE LOAD

(OR EVEN DUMP IT)



Double-Break Style 34.5 kv rating (above) and Side-Break Style, 14.4 kv rating (right)



with S&C Load Interrupters that cost no more than disconnects

Now from S&C you can get load interrupters at the same price as disconnects. This means that you can handle any kind of line switching in the simplest way at the lowest possible cost.

Here are the devices that do it:

1. The Side-Break Alduti Load Interrupter at 7.2 kv and 14.4 kv, and
2. The Double-Break Alduti Load Interrupter at 23 kv and 34.5 kv.

Both give you load dumping* (full 600-ampere arc-free load switching at full line voltage) along with loop sectionalizing (switching currents in parallel or loop circuits) and line dropping (switching line charging currents).

Since these switching duties at today's voltages and loads can't be handled by disconnects, why not compare the cost of S&C Load Interrupters with disconnects. You'll find there's no premium price for premium performance.

Here are some of the other advantages of S&C Load Interrupters:

- 600-amp load switching without line or feeder breaker openings
- a maintenance-free interrupting device
- no external arc
- can be mounted in any position . . . vertical, upright or inverted.

For more information, please contact S&C Electric Company, 4421 Ravenswood Avenue, Chicago 40, Ill.

* Important because: (1) Emergency situations (wires down, etc.) demand quick action, hence dumping the load. There is no time to set up communications for complicated breaker and switch sequencing. And (2) there's always the possibility of an operator error or misunderstanding, with the result that a loaded circuit may be dumped inadvertently.

S&C ELECTRIC COMPANY

S&C

"That old rockin' chair will get me* before you have to replace a...

CHANCE *Epoxiglas*† LADDER

*"The doc says I'm in real good shape and I'm just a year past the half century mark so my prediction about Epoxiglas ladders gives you many years of safe maintenance-free service ahead. If you want detailed test proof, let me know."

O. G. "Andy" Anderson

Moisture Proof...will not Splinter, Warp, Rot or Weather...Provides Years of Complete Safety

Chance Epoxiglas, originally developed for the safest, most indestructible hot line tool handles, has now been fabricated into strong, lightweight ladders with a high insulation level.

Epoxiglas ladders are *moisture-proof*. Water cannot penetrate the tough exterior and the unicellular construction of the foam center prohibits moisture paths from developing within the rails or rungs. Thus they are safe for hot line work or any type of line, substation, service entrance or manhole work and may be carried on trucks without the rapid weathering deterioration common to wood ladders.

These ladders are virtually maintenance-free because Chance Epoxiglas is not subject to the many hazards inherent in wood ladder construction. They will not splinter or warp. Every foot is uniform and the surface requires no refinishing. They have more than twice the average breaking strength of wood ladders of the same length and weight. They surpass *all* ASA strength requirements for portable wood or metal hook ladders.

Chance Epoxiglas ladders come in 8 to 20 foot lengths, equipped with hooks, safety chains and snaps for all types of line and station maintenance or without hooks for regular service use. Ask your Chance representative, or write us for specifications and prices.

A. B. CHANCE COMPANY

CENTRALIA, MISSOURI

(A. B. Chance Company of Canada, Ltd., Toronto)

CT61-5

†CHANCE TRADE MARK

Electrical World

MARCH 13, 1961
Vol. 155, No. 11

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NEXT WEEK

IS 500-KV WEST COAST TIE JUSTIFIABLE? EW scans recent proposal.

LATE NEWS ▸ **Largest steam plant in western Europe,** the 2,000-Mw West Burton plant of Britain's Central Electricity Generating Board, will have four 500-Mw tandem compound units, coupled by hydrogen/water cooled generators. Excitation is provided by direct-coupled ac exciter generator, whose output is rectified by silicon rectifiers. Steam conditions are 2,300 psi, 1,050/1,050F. First unit will go into operation in 1963.

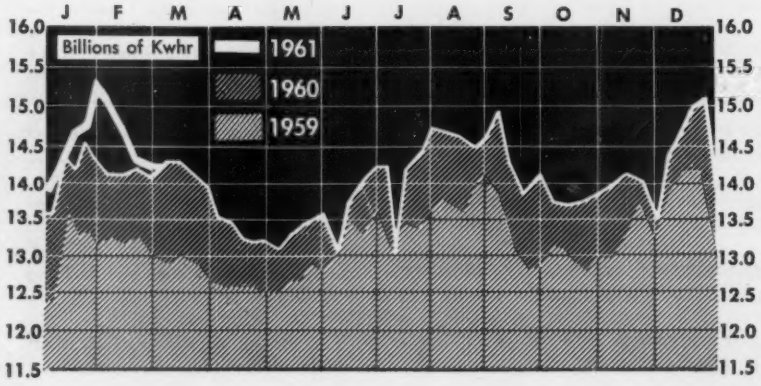
Use of outside consultants for Reclamation projects is okayed by Interior Department as speed-up in projects continues. According to Commissioner Floyd Dominy, 230-kv line between Glen Canyon and Four Corners has been jumped ahead two years and equipment is now being purchased. Bids for eight 125-Mw units will be opened April 11 and awarded in May. Opening of Yellowtail bids, advanced one month, will be April 11, too. Dominy also predicts crash program of federal construction, including step-up in existing jobs and in new contract awards if national economy does not pick up in normal seasonal pattern.

Unpublished AEC report may kill prospects for small REA and municipal reactors. Covering all familiar types of reactors, the reports by nine industrial reactor manufacturers show economic power from small reactors cannot be predicted either on 14% investor-owned utility fixed charges or on 6.4% used by public power groups.

Negotiating—Pacific Northwest utilities are trying to reach a binding agreement for coordinated operation of the Northwest Power Pool. Involved are investor-owned companies, public agencies and Bonneville Power Administration. Negotiations are presently aimed at establishing principles for a coordinated operation agreement—specific wording of contracts would come later. Bonneville spokesmen are favorably impressed with progress made so far, which includes a proposal drawn up by non-federal systems that is now being circulated. Contracts drawn under the agreement would override existing contracts. One pressure behind the negotiations is the impending treaty between the US and Canada to provide 15.5 million acre-ft of water storage to the US for added generation. Without a binding agreement between Northwest systems, added power benefits from Canadian storage could not be fully realized.

Watchdog committee—A special, permanent subcommittee to supervise regulatory agencies has been created in the House Commerce Committee. Rep Oren Harris (D-Ark.) will head the new group, which replaces Legislative Oversight Committee.

WEEKLY POWER OUTPUT—Down 1.0% (Week ending Mar. 4), Kwhr 14,226,000,000



Per Cent Change From Previous Year

	Feb. 18	Feb. 25	Mar. 4
Total U. S.	− 0.1	+ 0.3	− 1.0
New Eng.	− 5.3	+ 4.5	+ 3.6
Mid. Atlan.	+ 3.3	+ 3.0	+ 1.6
Cent. Indust.	− 5.6	− 5.9	− 7.1
West Cent.	+ 2.0	+ 2.8	+ 1.1
Southeast	− 3.8	− 1.7	− 4.0
South Cent.	+ 3.3	+ 4.0	+ 2.2
Rocky Mount.	+11.0	+10.7	+ 9.1
Pacific			
NW	+ 3.0	+ 4.0	− 0.9
SW	+ 7.4	+ 6.1	+11.5

Seasonally Adjusted Index 277

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Source: Edison Electric Institute

Supply Lines

SEN KEFAUVER MAY PUBLICIZE ANTITRUST CASES FURTHER

More extensive publicity of details of the Philadelphia antitrust cases may be in the works if Sen Estes Kefauver carries out his planned probe of the cases. Kefauver has already asked the 29 companies involved for names and job responsibilities of any individuals connected with the cases, and may also get from the Justice Department names of witnesses who testified before the investigating grand juries as well as company documents that were subpoenaed. Kefauver's aides say the Antitrust and Monopoly Subcommittee hearings would try to establish the responsibility of top management for the cases, find out if price fixing is still going on, and attempt to make public full details of the conspiracies.

CAPACITOR PRICES GO UP AND DOWN, AT THE SAME TIME

Last week saw the spectacle of capacitor prices going up and down, at about the same time. Following Federal Pacific Electric Co's lead of raising 50-kvar units to $117, Sangamo Electric Co and Allis-Chalmers Mfg Co also raised their prices to $117, the latter at midnight, March 3. But in the meantime, on March 1, General Electric Co cut its price from $100 to $97.33. Part of the reason for the two-way stretch is of course lack of communications. Other than reports salesmen get from purchasing agents, the only reliable information on competitors' price announcements comes from weekly news media. And in a fast-changing market, such as capacitors, a lot can happen in a week.

But the main reason for the ambivalence in pricing, is the ambivalence in the industry's thinking. To get anywhere near a modest profit, the industry says, the price should be up at about $120 (a few years ago it was in the $150-$160 range). But also to get anywhere near a traditional share of the market the price nowadays has to be around $100. The reason, of course, is overcapacity of production facilities.

The capacitor industry is variously quoted by those in it as now running at a half (or even less) of capacity. This is in spite of the fact that some consider 1960 to have been the second best year ever in unit sales (1956 was first). And 1961 is forecasted to be as good as 1960. Long-term, averaging out the cyclical peaks and valleys, the annual sales growth rate is considered to be 7% or 8%. Except in an abnormally high sales year, it will thus take the industry some years for demand to catch up with supply.

But demand may never catch up with supply. Although the net number of competitors in the field has gone up in recent years, while others have enlarged their production facilities, the main reason quoted for the overcapacity is the trend toward more compact units. With 50-kvar units today approaching the size of 25-kvar units yesterday, almost as many 50-kvar units can be built today in the same space required yesterday for the production of the same number of 25-kvar units. This in effect has almost doubled the production facilities in terms of kvar output. And the industry is now working to reduce the size of 100-kvar units to today's 50-kvar size, so that demand may never catch up with supply.

Obviously, something is going to have to give. One way might be for suppliers to cut down on quality, thereby cutting on costs. Barring that, the simplest way would be to have supply and demand approach equilibrium either through a decrease in number of competitors, or trimming of production facilities across the industry.

And then there is the raising of capacitor prices to $117. On the surface, this may

seem foolish, in view of the fact that prices quoted today are below the $100 level, which consequently reduces GE's published prices to the same level. (GE's capacitor price policy is to keep published and market prices at the same level.)

But if the intent in raising the price to $117 is genuinely to maximize profits rather than to maintain a traditional share of the market, there is an outside chance that prices might go up. What the $117 companies are doing, in effect, is taking their productive capacity off the market, since they cannot hope to get orders at that price now. Short term, these companies would be losing money, as they would not be taking orders necessary to cover their fixed overhead. Long term, if prices did go up with this method, they would profit, as long as their re-entry into the market did not cause another downward spiral, which would happen if others tried to maintain their *new* share of the market.

But there is serious doubt expressed as to the long-term feasibility of this third method, because, sources say, there would still be too much supply for the demand available. "Unless supply is permanently cut," one manufacturer says, "there is no long-term way out of today's low prices."

PRICES LOWERED ON GAS TURBINES, SWITCHGEAR

General Electric has reduced the price of its recently-introduced gas turbine package power plant from $100 a kw to $85 a kw for the basic plant. The company says the new price "reflects a move to meet current competitive market conditions."

In a separate field, Westinghouse Electric Corp last week announced it had reduced prices Feb. 1 an average of 5% for low-voltage metal-enclosed switchgear, and 15% for low-voltage air circuit breakers. Also the company has applied a new 5% discount to orders for *standard* group-operated outdoor disconnect switches.

SUPREME COURT OKAYS NASHVILLE-TAMPA COAL AGREEMENT

A long-term contract under which Nashville Coal Co agreed to supply coal to a new Tampa Electric Co power station does not violate the antitrust laws, the US Supreme Court has ruled. Justice Tom C. Clark, who wrote the Court's opinion, noted that contracts such as the one between the two companies may well be "suspect" under the antitrust laws, but he added, "they have not been declared illegal *per se*."

In the 1955 coal agreement, a predecessor of Nashville agreed to supply all coal requirements for two units of a new Tampa power station for 20 years. But after Tampa had spent about $7.5 million readying the new units, Nashville notified Tampa the contract was illegal and would not be carried out. Nashville claimed the contract violated Section 3 of the Clayton Act which prohibits contracts involving restraint of trade and exclusive dealing. Lower courts agreed, even though they found the contract did not contain an express condition that Tampa would not use coal sold by Nashville's competitors.

But Justice Clark ruled that even though the contract may have been an exclusive dealing arrangement under Clayton Act terms, it still did not violate the Act because it did not significantly affect competition in a specific market area. Justice Clark ruled that the market area was much larger than Nashville thought it to be, and as a result the amount of coal involved in the Nashville-Tampa contract represented less than 1% of the area's total sales, "quite insubstantial," he noted.

Only one Unipost goes 9 places

With just one catalog number of O-B Unipost, you can build three different stacks with ratings of 650, 900, and 1300 kv BIL. These are adaptable to six popular operating voltages from 138 to 345 kv.

If you use stacking posts at two or even three voltages, you may be able to build and maintain all these posts with only one type of Unipost unit.

There are no specialized or single-purpose Uniposts. The identical unit is used in every stack position. Furthermore, in application, the units are highly interchangeable, as the foregoing example demonstrates. This is just one of many possible combinations in the complete Unipost series.

Major inventory savings are obvious. Less obvious, but equally valuable, is the lack of confusion in the warehouse and on the construction site. Simply give a man a Unipost - - it will fit anywhere!

Coupled with these savings and conveniences are worthwhile design improvements which O-B has incorporated in this new insulator.

Your O-B representative can give you the whole Unipost story - - can demonstrate many of its features with attractive, desk-size, scale models - - can equip you with complete catalog and application data. Get these facts before placing your next stacking post order.

OHIO BRASS COMPANY, MANSFIELD, OHIO
Canadian Ohio Brass Co., Ltd., Niagara Falls, Ont.

Ohio Brass (B) HOLAN

PORCELAIN INSULATORS • LINE HARDWARE • CAPACITORS • LIGHTNING ARRESTERS
BUSHINGS • HOLAN TRUCK-MOUNTED POWER DEVICES AND BODIES • BRONZE VALVES

10015-H1

How to save money on arresters

How dependable is an intermediate class lightning arrester? Ask this about all kinds of arresters, and you should get all kinds of answers. Ask it about the Thorex Dynagap Type GP, and here are the facts.

ITEM: The present intermediate class Thorex Dynagap arrester materially exceeds industry-wide performance of *all* arresters up to the year 1957, regardless of class or price. This gives you a realistic measure of what this arrester can do for you, based on your own experience with the best available (including O-B) four years old or more.

ITEM: Current models of Thorex Type GP easily pass the ASA test for 65,000-ampere, high current, short duration withstand. Their performance under ASA duty cycle test is not only completely acceptable, but demonstrates a unique ability of the arrester to accomplish total arc extinction well in advance of the first current-zero condition of the 60-cycle wave. On the ASA low current, long duration durability test, the intermediate class Thorex arrester withstands 20 applications of 500 amperes for 2,000 microseconds. This is over three times standard requirements for *station* class, and is conducted in a compressed time period of only 1/10 that permitted by standards.

ITEM: According to current industry reports, IR discharge performance of the Type GP Thorex is within only a few per cent of that for station class. In view of the difference in duty between intermediate and station class, this indicates remarkable proficiency.

You have the proof - - and you can have the arrester for about half the cost of present station class equivalents. Especially on low-budget projects, Thorex Dynagap intermediate class Type GP arresters are ideal. They render a superior grade of equipment and service protection, at least equal to what was considered the very best when most of your stations were built. You can install them with confidence.

OHIO BRASS COMPANY, MANSFIELD, OHIO

Ohio Brass

HOLAN

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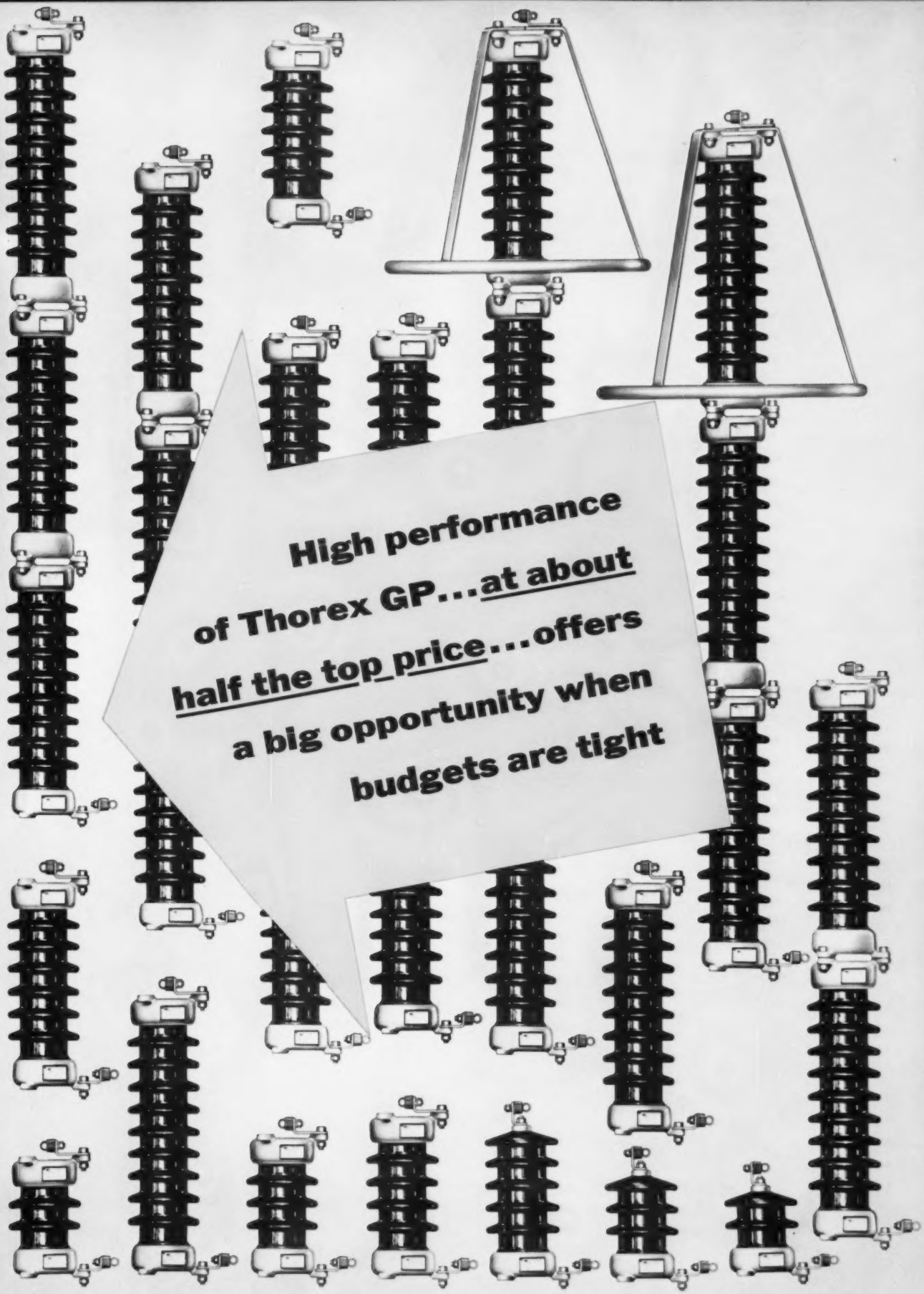
High performance
of Thorex GP...at about
half the top price...offers
a big opportunity when
budgets are tight

It's there... use it

O-B bushing design takes high strength of core and transmits it to the total structure

Wound paper and foil condenser cores of O-B Class GK oil-filled bushings are wrapped under tremendous pressure - - they're hard as an oak log, and as strong.

O-B bushing construction capitalizes on this strength. At numerous points below the flange, where mechanical duty is severe, the core and external parts are in contact. Strength of the core is transmitted to the bushing as a whole. Shocks of circuit breaker action are dealt with harmlessly. Permanent alignment is assured. Longer trouble-free life is inherent in such a design.

All it takes is expression of your choice to get O-B on new station apparatus. The strength that is naturally there is put to work for your permanent benefit. When you state a choice for O-B, you have stated the best choice. Performance proves it.

OHIO BRASS COMPANY, MANSFIELD, OHIO
Canadian Ohio Brass Co. Ltd., Niagara Falls, Ont.

Ohio Brass ®
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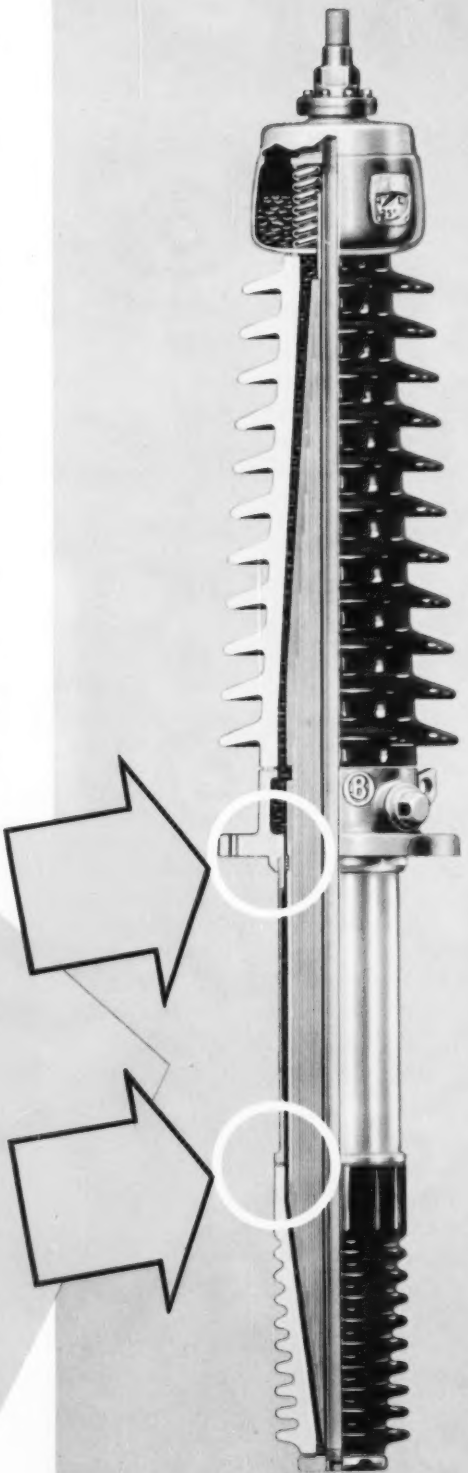


Multiple points of contact are made between core and external parts in these areas These are interspersed with free oil passages as shown in illustration

COMPRESTO® CABLE AND COLOR TOO!

with HYPALON*

Color-coded cables insulated with HYPALON now make color coding practical in secondary networks.

Available in black, electrical red and electrical grey, specially developed HYPALON Insulation provides outstanding resistance to ozone, heat and chemicals.

Olin Conductors can now supply you with color-coded COMPRESTO Cable for secondary multiplex installations. The advantages of HYPALON Insulation are also available in service drop wire.

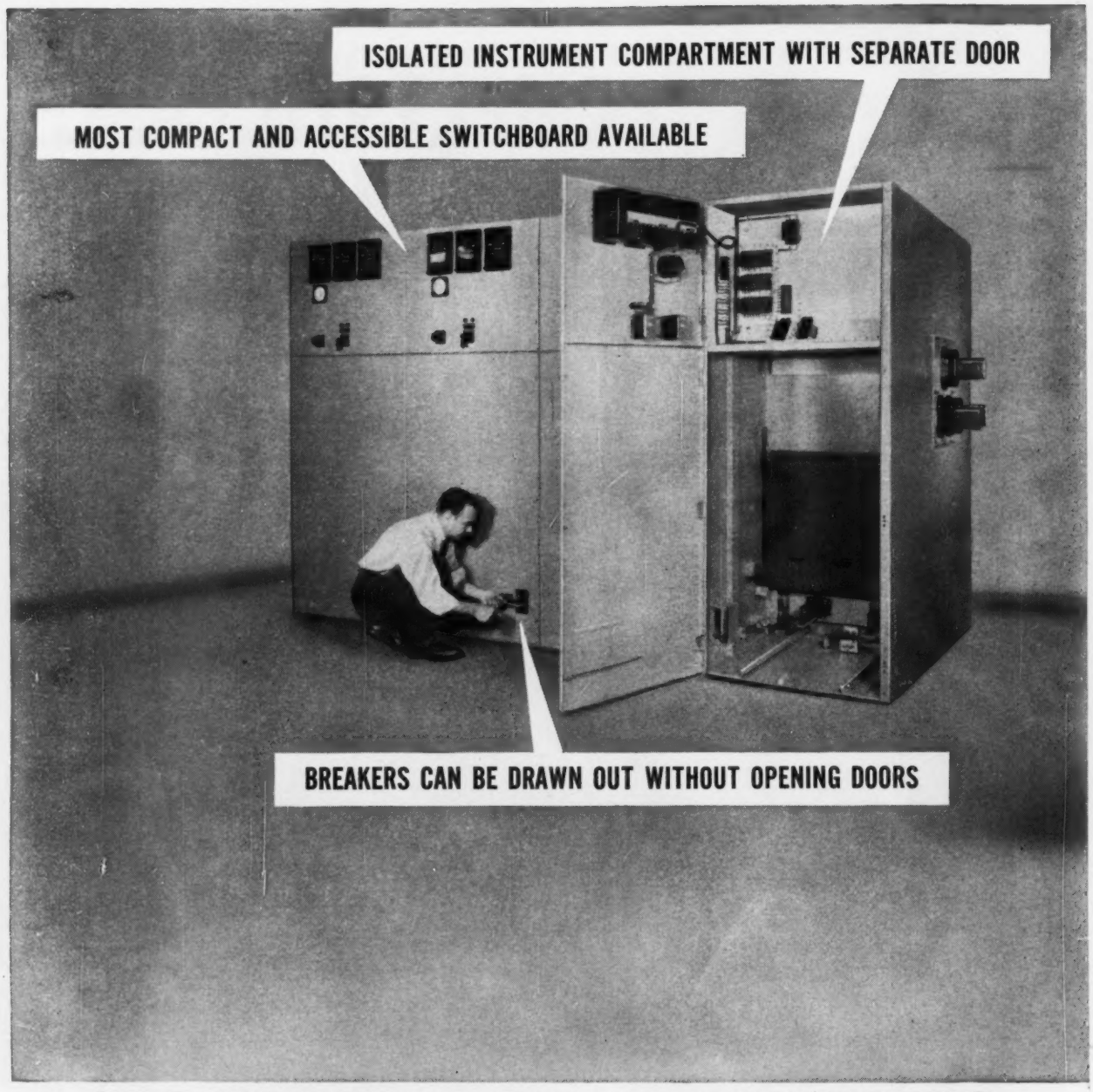
In addition to its outstanding resistance qualities and lasting color, the electrical properties of HYPALON permit its being rated as a 600 volt class multiplex.

COMPRESTO Conductors plus HYPALON Insulation! A revolutionary combination from two great names: Olin Conductors and DuPont!

*HYPALON is a registered trademark of E. I. DuPont de Nemours & Co. (Inc.)

OLIN CONDUCTORS

METALS DIVISION Olin P. O. Box 989 • Chattanooga, Tenn.

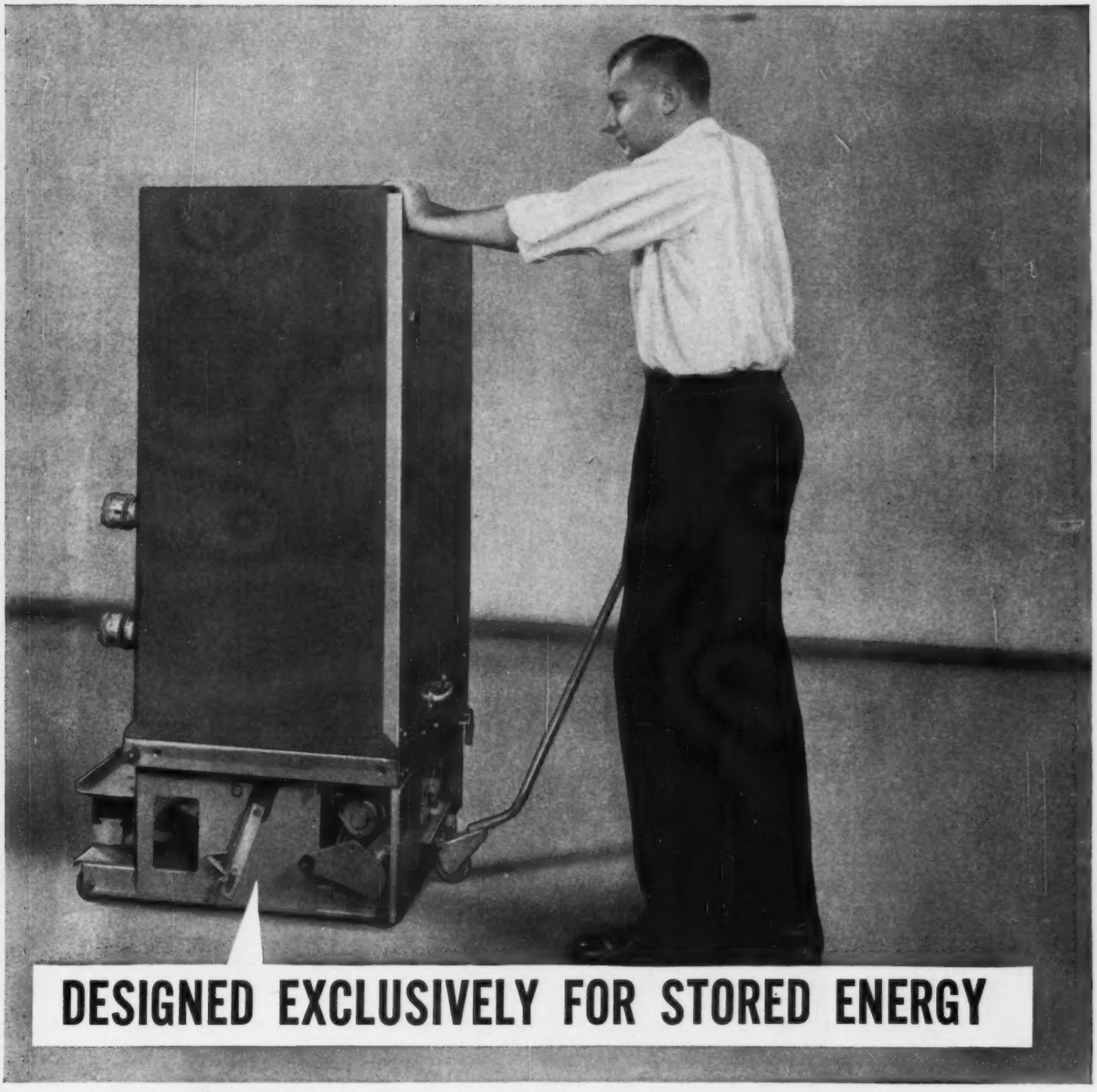

ISOLATED INSTRUMENT COMPARTMENT WITH SEPARATE DOOR
MOST COMPACT AND ACCESSIBLE SWITCHBOARD AVAILABLE
BREAKERS CAN BE DRAWN OUT WITHOUT OPENING DOORS

NOW YOU CAN ALWAYS,

have fast, safe operation of your

Stored energy closing is just one of the many big progressive steps forward you will find in this all-new I-T-E 13.8 kv switchgear. So is the separate, isolated instrument compartment . . . and the closed door drawout . . . and the more compact switchboard! Here is new safety, new long life potential, and new greater assurance of uninterrupted service.

One man can handle the entire maintenance job. The breaker is not only smaller, it's significantly lighter—the result of using new, more modern materials. Phase barriers may be easily removed by one man. Arc chutes can be tilted back. The breaker frame may even be flipped over without assistance. With the huge cable makeup area and the easily accessible bus, this is truly the easiest to maintain 13.8 kv switchgear yet.



ALWAYS, IN ALL WAYS

13.8 kv circuit breakers every time

If you are about to specify new 13.8 kv switchgear, make sure you get all these I-T-E advantages. And right now send for illustrated Bulletin 2800-2B, with complete details. Or contact your nearby I-T-E sales office. I-T-E Circuit Breaker Company, 1900 Hamilton St., Philadelphia 30, Pa.

I-T-E CIRCUIT BREAKER COMPANY

LET'S TALK FUSE LINKS

■ Outwardly most fuse links look very much alike . . . but there the similarity ends! What, then, makes Kearney Fuse Links more dependable . . . more accurate than others? ■ Let's start with construction. All Kearney Fuse Links feature LOW temperature fusible elements and de-ionizing fibre lined tubes. Temperatures inside fuse tube and cutout cartridge always remain well below the fibre charring point . . . even after prolonged service overloads. Thus, the all-important fibre is not impaired by excessive heat . . . fuse tube and cartridge retain their original strength and arc-quenching capabilities necessary for positive full-range fault interruption ■ The exclusive de-ionizing fibre lining and extra strength of the Kearney fuse tube, in effect, make the Kearney Fuse Link a cutout within a cutout when interrupting fault currents up to 600 amperes.* Extra-long, tough, moisture and weather resistant tube provides a longer de-ionization path to clear low faults faster, more positively . . . will not warp or hang up in cartridge. Fuse tube and top terminal are securely joined to prevent loss of expulsion gas pressure ■ Select components, rigid quality control, exhaustive laboratory and substation testing guarantee strict adherence of Kearney Fuse Links to published T-C curves. For positive system protection and accurate co-ordination . . . specify Kearney Fuse Links . . . Standard or Specialized.

*An average figure varying with different fuse ratings.

KEARNEY

for better construction . . . safer maintenance . . . specify KEARNEY products

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4224-42 Clayton Avenue, St. Louis 10, Missouri

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Type 316

Type 316

story of two bolts...

Both of the bolts shown above were used on the *same* application, in the *same* factory, and faced the *same conditions*.

The bolt on the left is a Harper type 316 Stainless Steel bolt shown after three years of service. The bolt on the right is another manufacturer's bolt, identified as type 316 Stainless Steel, shown after only three months of service.

The dramatic fact that the Harper bolt lasted twelve times longer (and is still in service) is proof of Harpers' metallurgical control of alloys from "billet to bolt" in our completely integrated factory. Harper's corrosion-resistant fastenings, immediately available in a wide range of alloys and sizes, assure you that *your* products will be built to last no matter what the application may be.

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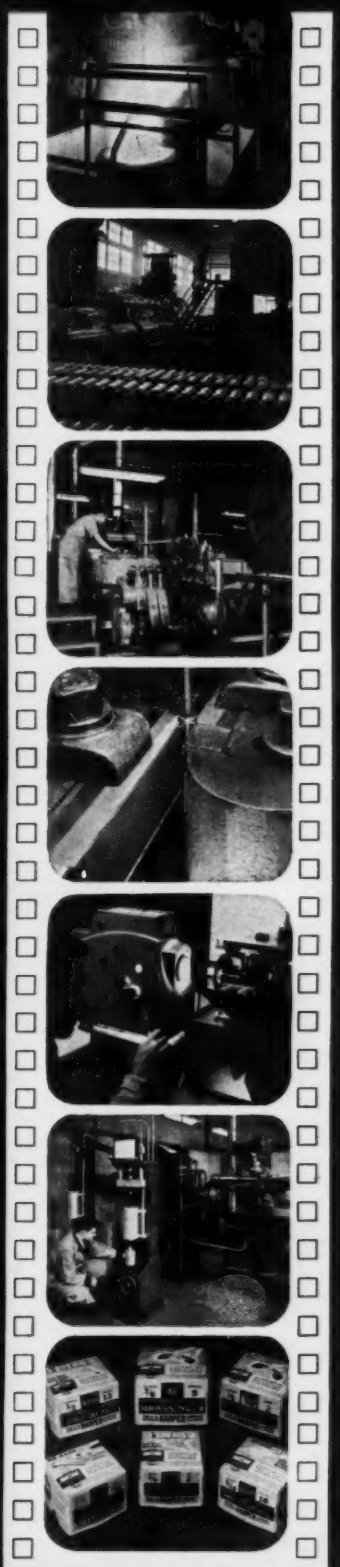

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THE H. M. HARPER COMPANY
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Both of these popular CRESTOLOY LINEMEN'S PLIERS are individually tested!

This Plier is made of CRESTOLOY STEEL and has tested 100% satisfactory
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No. 1950 is made in 6, 7 and 8" sizes; No. 2150 in 8" size only. Sold by Hardware Dealers and Electrical Distributors everywhere.

Both pliers are available with insulated handles of blue Tenite. This material is tough, wear resistant and has high dielectric value.

CRESTOLOY PLIERS ARE "YOUR FINGERS OF STEEL"

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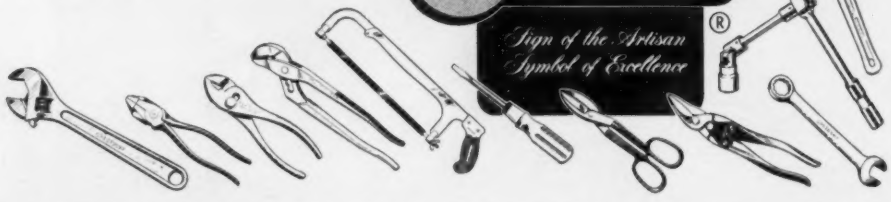

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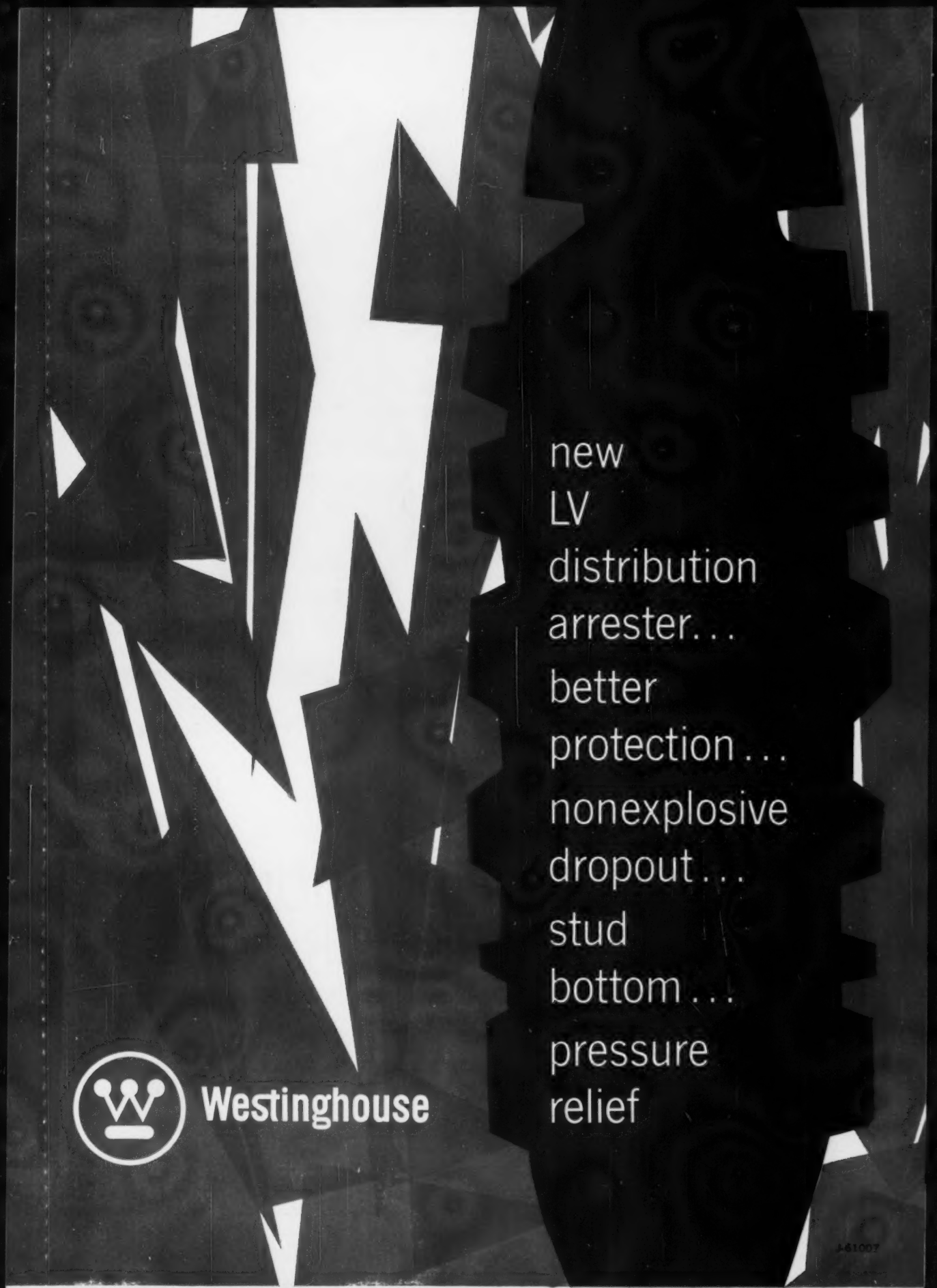
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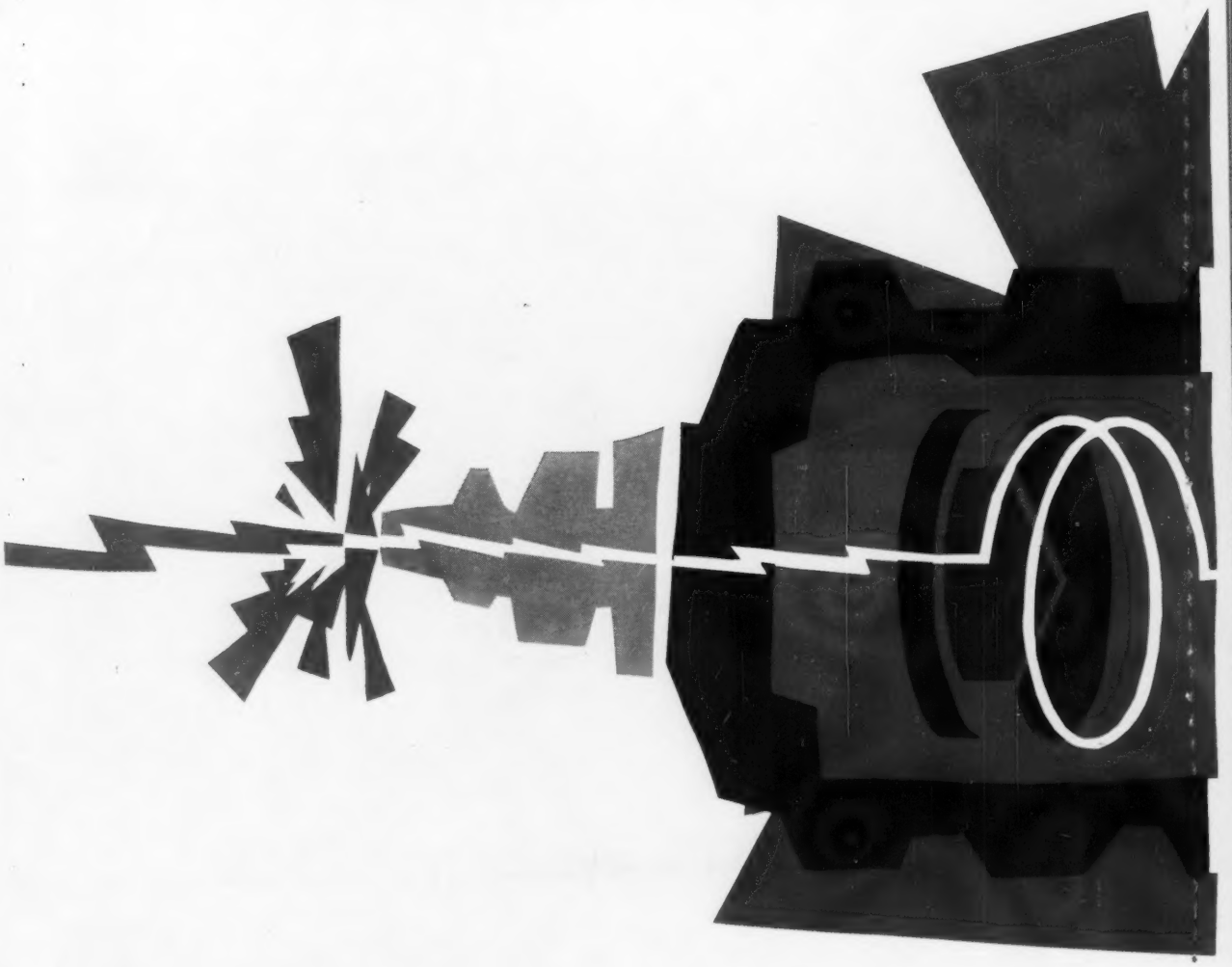

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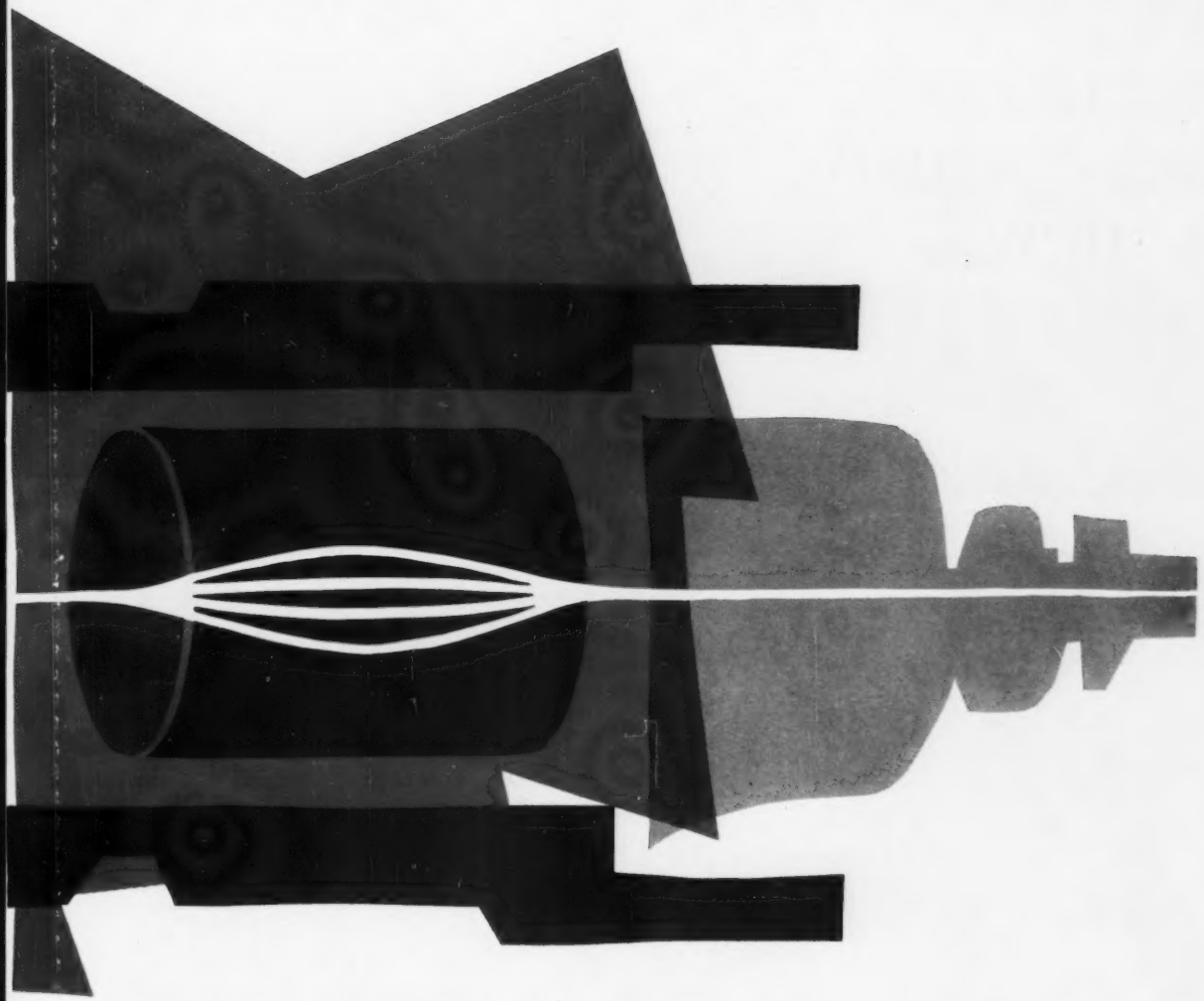

■ Mobilarc* gap construction, as in station class arresters, eliminates pitting and burning. ■ Stud top and stud bottom—preferred construction. ■ Unique, nonexplosive dropout—that vents internal pressure for safe handling and reliably prevents line lockout on any distribution circuit in event of arrester damage. ■ Full details on the new Type LV Autovalve® lightning arrester are available from your Westinghouse representative. Call him, or write Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pa. You can be sure . . . if it's Westinghouse.

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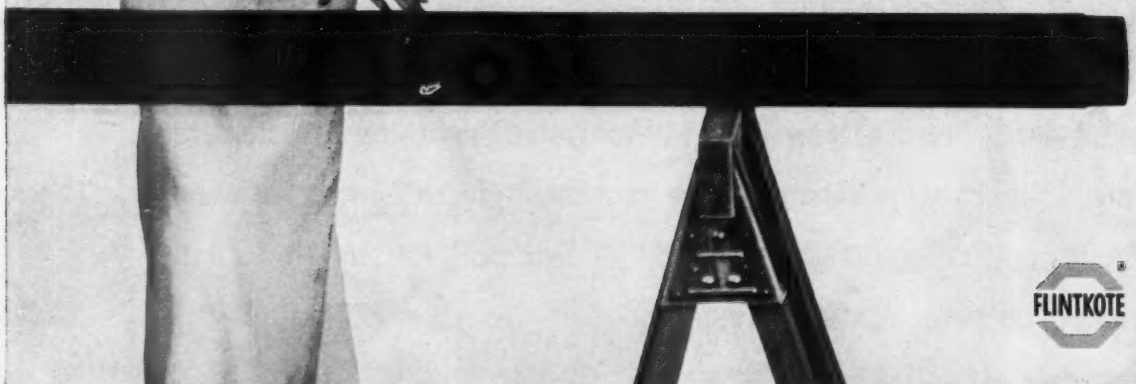
Nothing has been changed in the traditional fine quality of the Orangeburg product. New *klean-kote* is just what the name implies—*a clean coating*. Beneath it lies the same quality product, manufactured with the same painstaking care which has made Orangeburg the best-known, best-selling line in America. Ask your wholesaler to show you a length of new *klean-kote* Orangeburg now.

Cleaner hands Cleaner clothes No irritation

klean-kote* **ORANGEBURG®** ***Fibre Conduit***



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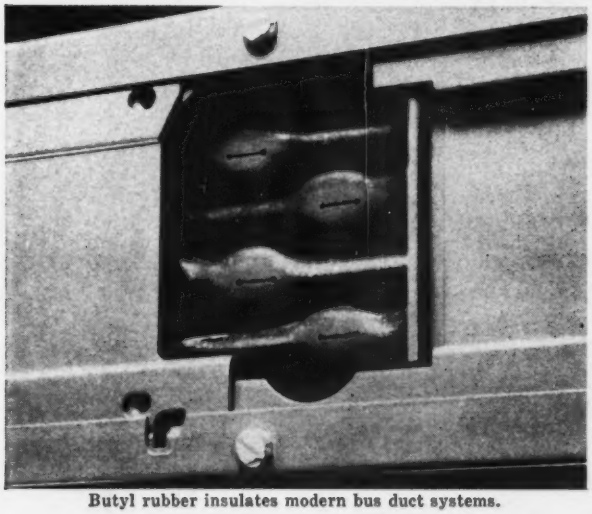
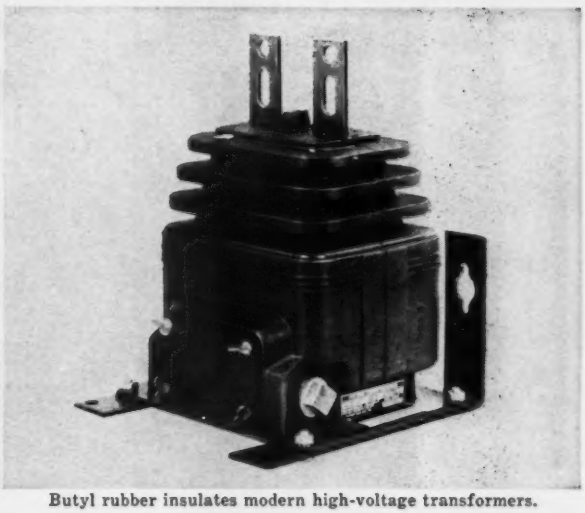
Butyl rubber insulates modern high-voltage transmission lines.



Butyl rubber insulates modern bus duct systems.



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Enjay Butyl tops all vulcanizable rubbers in electrical and dielectric properties . . . in resistance to corona and ozone breakdown and water absorption. Its high dielectric strength insures against electric breakdown under normal or surge voltage. Its heat resistance permits higher current flow for a given conductor size. Butyl also offers outstanding resistance to weathering and sunlight . . . chemicals . . . abrasion, tear and flexing . . . superior damping properties ...unmatched impermeability to gases. Result? Butyl is ideal for wire and power cable, transformers, tapes, bus bars, and other insulation applications.

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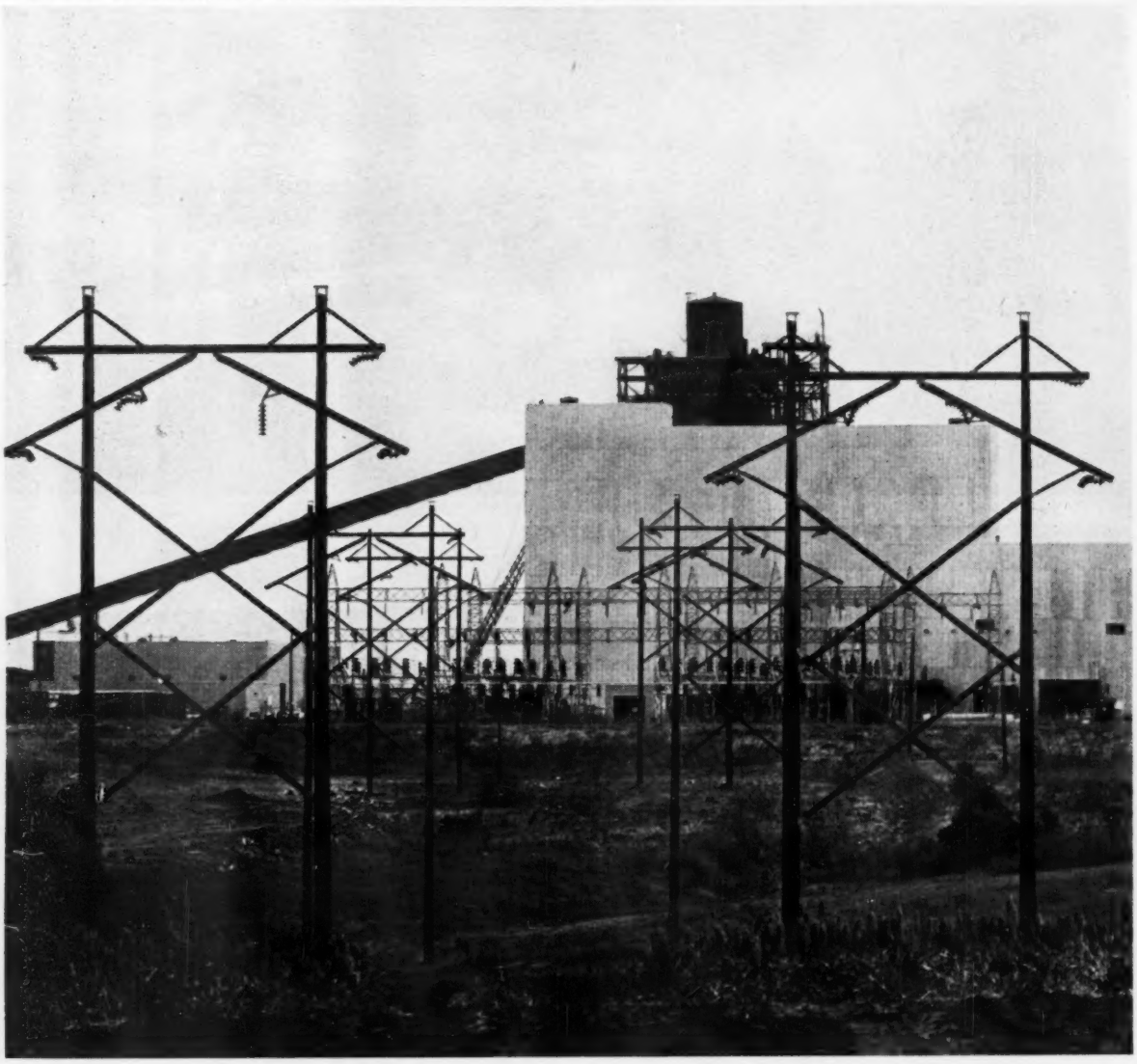

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Helping the world double its power supply in the next ten years

The fuel of the future is in the atom. But even now, lights are burning, wheels are turning, thanks to atomic fuel. Atomics International, a world-wide leader in advanced, high-performance reactor systems, has over 15 years' experience in designing, constructing, and operating reactors. Two of the world's most advanced atomic power stations are now being built by AI under AEC programs. The wealth of experience and facilities at Atomics International will help the world's power-producing companies in their plans to double the supply of electricity in the next ten years.

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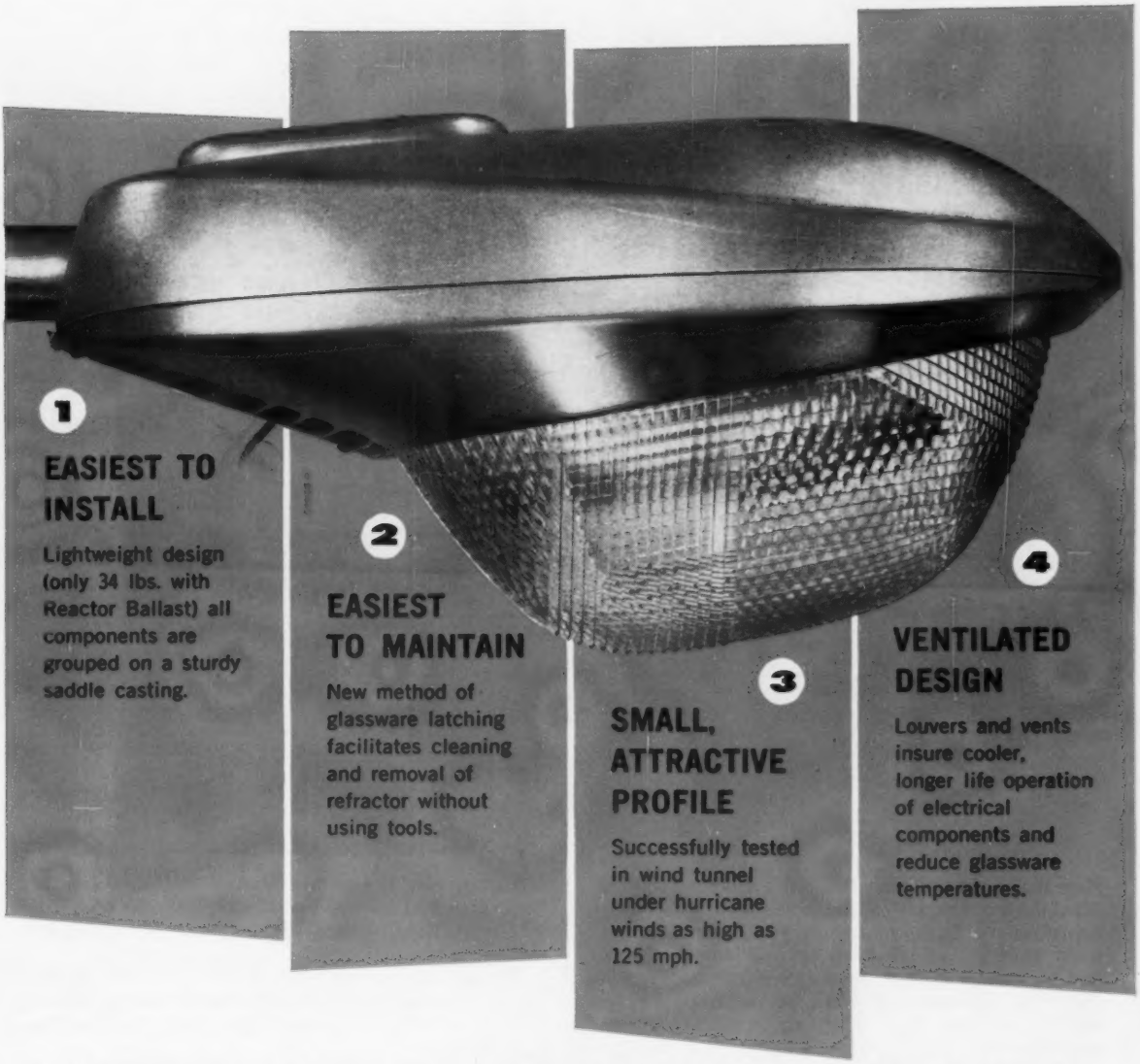
Here's What Makes The JOSLYN "400" Built-In-Ballast Luminaires Better...

...the results of imaginative research, sound engineering and advanced methods of manufacture



1

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Lightweight design (only 34 lbs. with Reactor Ballast) all components are grouped on a sturdy saddle casting.

2

EASIEST TO MAINTAIN

New method of glassware latching facilitates cleaning and removal of refractor without using tools.

3

SMALL, ATTRACTIVE PROFILE

Successfully tested in wind tunnel under hurricane winds as high as 125 mph.

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VENTILATED DESIGN

Louvers and vents insure cooler, longer life operation of electrical components and reduce glassware temperatures.

You can depend on Joslyn's long established reputation for advanced quality equipment

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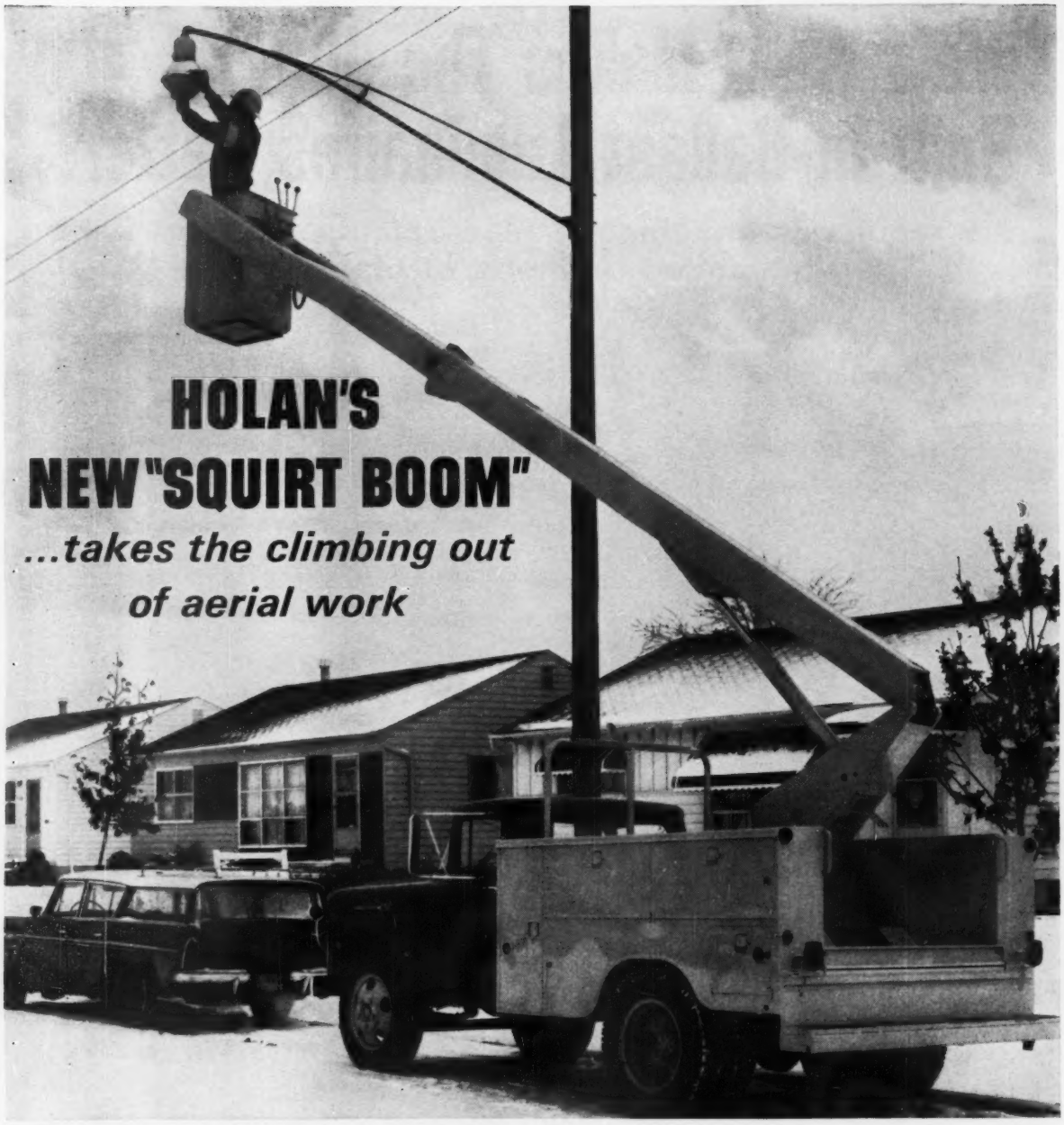

Here it is — Holan's new all-hydraulic Squirt Boom. Ideal for troublemen . . . the fast, safe way to re-fuse transformers. Saves money in group lamp replacement work . . . no climbing up and down a ladder and material and equipment ride in the bucket with the man. Speeds such work as installing electric service, mid-span taps, traffic signal and street light maintenance.

Now one man can do many aerial tasks because he has complete control with levers mounted on the fiberglass bucket (boom and bucket tested at 73,000 volts (A.C.) bucket-to-ground). Telescoping fiberglass boom extends 10′7″. . . raises to a 40-foot working height . . . rotates 360° in either direction. A hydraulic slave cylinder, located in fiberglass bucket yoke, keeps bucket level at all times.

Safe, dependable master-slave type controls are mounted on the bucket and on superstructure. Offset superstructure design and exclusive Holan torsion bars, attached to the body base, provide stability in all positions with a 300-pound payload . . . no outriggers needed.

Let us send you more details on the Holan Squirt Boom . . . designed and built for safe, fast, economical aerial work. Call your Holan Field Representative, or write us.

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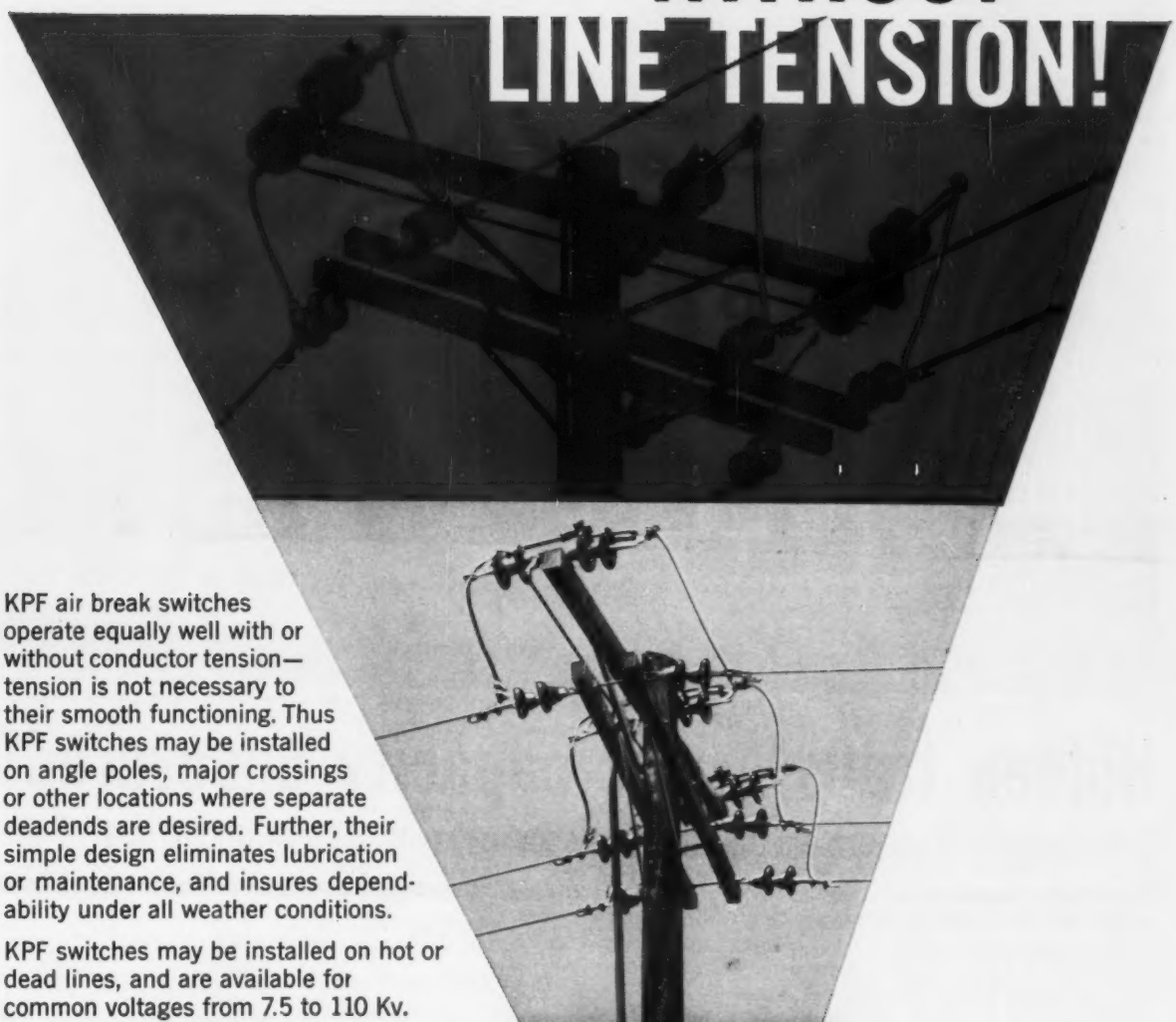
INSTALL KPF SWITCHES WITH OR WITHOUT LINE TENSION!



KPF air break switches operate equally well with or without conductor tension—tension is not necessary to their smooth functioning. Thus KPF switches may be installed on angle poles, major crossings or other locations where separate deadends are desired. Further, their simple design eliminates lubrication or maintenance, and insures dependability under all weather conditions.

KPF switches may be installed on hot or dead lines, and are available for common voltages from 7.5 to 110 Kv.

Test KPF switches with an installation on your own system. Inquire now!

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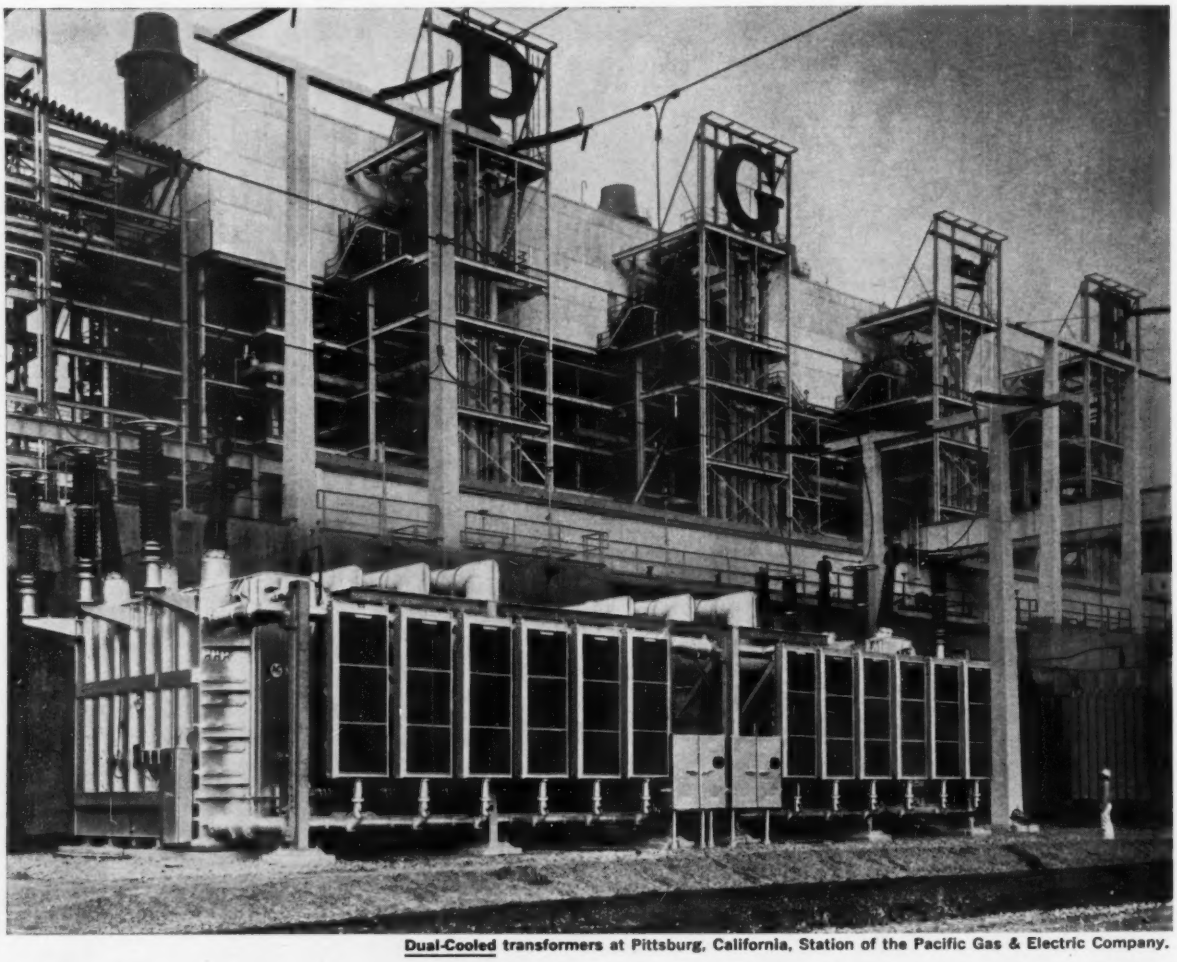


Dual-Cooled transformers at Pittsburg, California, Station of the Pacific Gas & Electric Company.

Hidden transformer capacity uncovered!

Dual-Cooled* transformers boost emergency capacity 33% without loss of life

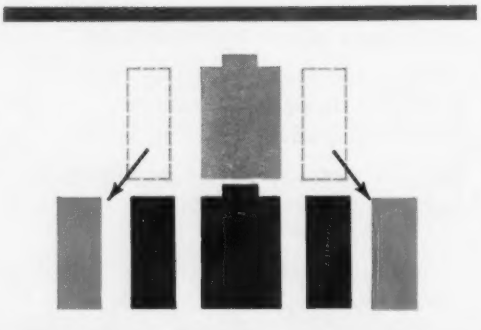
Dual-Cooled transformers — an A-C development — are utilized at this central station to permit two-thirds of the turbine output to be carried in the event one transformer is off the line. In an emergency, cooling equipment from both units is connected to the functioning transformer. Result: Capacity of either unit with dual-cooling is increased one-third over its normal rating.

For substations under gradual load growth conditions, the *Dual-Cooled* transformer capacity bonus can defer purchase of additional units. Smaller transformers can be installed without paying for little-used standby capacity. You save on installation costs, on real estate, fencing, concrete and taxes.

Dual-Cooled transformers are available in any rating from 20,000 kva up. Contact your conveniently located A-C office or write **Allis-Chalmers,** Power Equipment Division, Milwaukee 1, Wisconsin.

A-1426

*Dual-Cooled is an Allis-Chalmers trademark



Another method of dual-cooling is the physical transfer of coolers from one transformer to the other.

Editorial Comment

MARCH 13, 1961

A Crucial Year in Washington for Investor Utilities

In the seven short weeks that the Kennedy Administration has held office it has gone a long way toward disclosing just how it stands on electric power matters. Reports from our Washington correspondent tell of the feverish activity at the Interior Department and other agencies to get the Kennedy program rolling. Numerous projects are being readied for immediate action and broader policies are promised in the months ahead.

At this juncture in time, we offer this appraisal:

For publicly owned utilities, rural cooperatives, and other pro-federal power advocates, the Kennedy Administration is becoming a focal-point of leadership. Their counsel is being sought. They can expect that their advice and proposals will receive priority consideration.

For the investor-owned utilities, the reports coming out of Washington should herald an "on your toes" alarm. While the investor utilities may have lost contact with the White House, their pleas will still be heard in Congress. But it is becoming apparent that this segment of our industry is going to have to learn to talk in national terms of economic growth, battling recessions, and strengthening national security.

With constructive alternatives, with imaginative plans, with hard work, the investor utilities can hold their own against the federal proposals that seem sure to come. The real importance of a good showing this year is that it will be reflected in the broader, longer range policies that the Administration will be evolving in the months and years ahead.

Industrial East Begins to See Government Power

Government domination of hydro power, long established in the West, now has a firm and widening bridgehead in the industrial East. Just last month the Power Authority of the State of New York put on line the first units of its 2,190-Mw Robert Moses Plant on the Niagara River.

Headlines on the Niagara development should be an ironic reminder. For there, some 70 years ago, the still-adolescent investor-owned utility industry proved the practicalities of large-scale hydro power and its long-distance transmission.

Five large New York state utilities, among them Niagara Mohawk, the original developer of the Niagara, fought a losing battle to continue the industry's historical role by building the new project. But big government, in this case state government, won out.

New York State will remain a battleground. Last year PASNY put in full service its St. Lawrence hydro project. And seeking new fields to conquer, Director Robert Moses is trying very hard to put the state in the atomic energy business.

There is speculation that the Bureau of Reclamation may be authorized to extend its activities in the Eastern states. There is a flurry of activity at the state level about projects on the Delaware River. And government agencies will be casting eyes at other eastern streams as the spirit of the New Frontier blooms.

The industrial East, once relatively immune to federal and state power penetration, is seeing what may be only the opening skirmishes of a long, hard battle.

Ken Holum Interviewed on Power

New assistant Interior secretary is fairly non-committal on many questions of interest to the electrical industry

The man sitting atop Interior Department's far-flung electric power empire is Assistant Secretary Kenneth Holum. As assistant secretary for water and power, Holum is responsible for the operations of the Reclamation Bureau, the Bonneville Power Administration, the Southeastern Power Administration, and the Southwestern Power Administration.

It is Holum who will have to carry out a major part of the power policy set forth in President Kennedy's natural resources message to Congress (EW, Mar. 6, p 24), and policy and directives issued by Interior Secretary Stewart Udall.

In this exclusive *Electrical World* interview Holum gives some answers to questions utilities are asking about the new Administration's plans.

Question—The President uses the term, "common carrier," in reference to new federal transmission lines (common carrier lines would allow different systems to purchase a portion of the lines' capacities to wheel their own power). Are you going to emphasize common carrier lines in various regions?

Holum—"You're going to hear a lot about common carriers in the next few years."

Question—The common carrier principle could be used to plan federal lines other than those intended to connect federal systems. Will this happen?

Holum—"I expect federal lines to be limited to connecting the federal systems."

Question—The President's natural resources report says the federal systems should give power preference to "rural and domestic" customers. Does this mean a change in policy away from preference strictly to public and co-op systems?

Holum—"The term won't be overriding for the present priority to co-op and municipal systems."

Question—The President's message calls for more federal "responsibility" in power generation. Does this mean "utility responsibility?"

Holum—"No comment." Subsequently, he added, "What we're most interested in is the responsibility to provide for the maximum public benefit."

Question—The most actively-discussed federal transmission lines today are the proposed 500-kv circuits between Bonneville Power Administration and California, and the backbone system for the Colorado River Storage Project. Are there plans for other lines coming soon?

Holum—"There might well be."

Question—The President's message mentions expansion of power pooling. What is being planned along this line?

Holum — "Again, whatever is needed for the maximum public benefit."

Question—The President's reference to "national cooperative pooling" is rather vague. How do you interpret it?

Holum—"I see it as all segments of the industry working together."

Question — Does "cooperative pooling" mean cooperative ownership, or operation, or planning, or what?

Holum—"Well, there are a lot of legal problems involved in cooperative ownership. Planning and operation would be a lot easier."

Question—Will the Administration present Congress this year with a revised formula for allocating costs at federal multipurpose projects?

Holum—"It may or may not be ready this year. Actually, this is a very serious and a very complicated problem."

Question — Douglas Wright, Southwestern Power Administrator, has made a study of possible development of pumped-storage power facilities at many federal reservoirs in his area. Has the Department reached any decision on this study?

Holum—"I'm not familiar with it."

Question—Does the Department have plans for inclusion of pumped-storage facilities in future projects?

Holum—"It's a very exciting field."

Question — Do you think the Administration will favor "partnership" development of pumped-storage projects on federal reservoirs—as Public Service Co of

INTERVIEWED in his office, Holum gave Burkey Musselman terse answers

Questions and Philosophy

Oklahoma is now proposing for Keystone Reservoir, Okla.?

Holum — "The federal government has a very real interest in its reservoirs."

Question—Does that mean you might want to hold these reservoirs for federal development only?

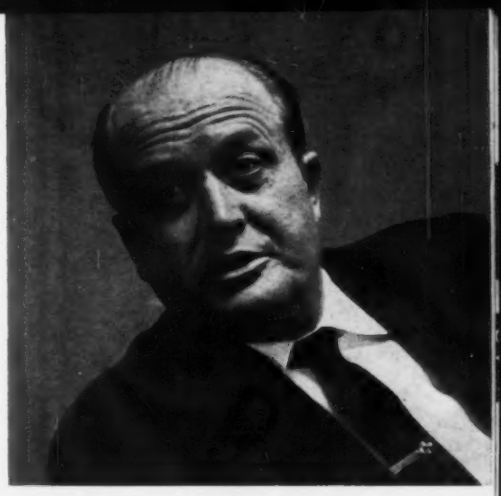
Holum—"It might well be."

Earlier, Holum had been questioned on similar subjects by the House Interior Subcommittee on Reclamation. Here is a portion of that questioning:

Rep John Saylor (R-Pa.)—"If you have a situation where your public agencies and cooperatives, instead of being satisfied with supplying the domestic customers, are now beginning to make a play for more and more business, and more and more power for industry in that area, what will your position be as with regard to the distribution of power?"

Holum—"I think in those areas where the people have determined that they want to be served by a municipal utility, that they want to be served by a cooperative, or that have determined they want to be served by a consumer power district, or some other agency of some other type, we should make every effort to make certain that adequate supply of energy is available so we can promote, rather than discourage, industrial development."

Holum — "I think the federal government has a real responsibility to make sure that electric energy is always available in adequate supply and at reasonable rates; and I think the federal government's responsibility is a responsibility of providing leadership . . ."



HOLUM: ' . . . whatever is needed for the maximum public benefit.'

Luce Plans Expansion of BPA Authority

Bonneville Power Administration's authority and influence will be both expanded and extended during the next four years, says its new administrator, Charles F. Luce.

"We will reactivate and expand the effort of Bonneville to achieve maximum development of low-cost Columbia River power . . . the Columbia and Snake River basins have a power potential of 38 million kw, of which 9.8 million kw, or only 26%, has been developed." Luce made these statements in Portland, Ore., shortly after being sworn into office.

Luce later made these comments:

• "We will vigorously support the primary responsibility of the federal government for construction of the large multipurpose projects where power and such nonreimbursable features as flood control, navigation and recreation are concerned. Particularly important among these are Libby and Lower Monumental dams."

• "We will urge ratification of the Canadian treaty in this session of Congress, and we will work for coordinated operation of all Northwest power resources to take full advantage of the treaty."

• "In the field of atomic power, we will support completion of the dual-purpose reactor now under construction at Hanford (Wash.), together with power generating facilities."

• We must take a new look at our Bonneville marketing programs and policies. A recent estimate made by Bonneville indicated that if all the firm and secondary power available had been sold during the past fiscal year power revenues would have been increased by over $30 million. Although the fact has not been highly publicized, Bonneville has been operating in the red since 1958. Dr Pearl (former administrator) has predicted further annual deficits for 1961 and 1962 of about $13 million each year . . .

"We hope to institute at Bonneville new marketing policies and programs, in cooperation with key economic and resource groups, that will again place Bonneville's operations 'in the black.' We intend to take every step possible to hold the present Bonneville postage-stamp rate at $17.50 a kilowatt-year."

• "A high-voltage intertie with Canada is already under study, looking to the ratification of the US-Canadian storage treaty. Limited studies have been made by Bonneville on possibilities of interties with California, the Missouri and Colorado River basins.

"I intend that Bonneville shall give the most careful consideration to both present and new proposals for regional power interties under the following criteria: **(1)** Power exchanges must be mutually beneficial and economically feasible. **(2)** There must be iron-clad guarantees that the regional priority of the Pacific Northwest to power generation of its own streams will be protected."

• "It is obvious that Bonneville cannot achieve these goals overnight, or without the cooperation and teamwork of all concerned. I hope that Bonneville can play an important part in developing cooperative relationships with private business and with all public agencies in the resource field . . .

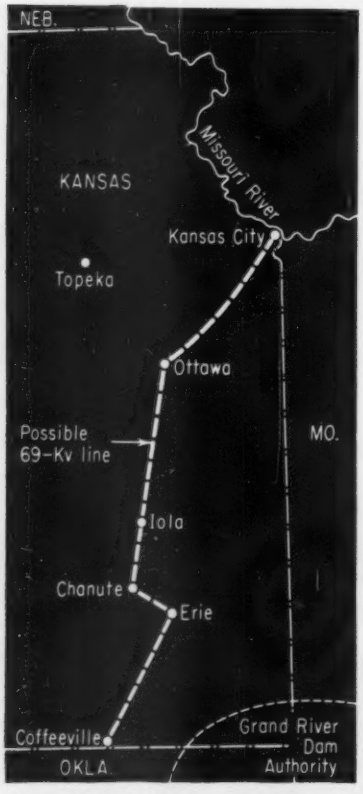
"Both public and private power resources of the area should be developed to the fullest extent. Bonneville will extend its fullest cooperation, through its wheeling program, system power studies and technical assistance, to both publicly and privately owned utilities toward this end."

Six Kansas Municipals Study

Eye Southwestern Power Administration as source of peaking power. Bill in legislature casts doubt on project

Six municipally-owned utility systems in eastern Kansas have banded together into the Kansas Municipal Power Pool to study the feasibility of supplying themselves with firm and emergency power through an interconnection. The cities, Kansas City, Kan., Ottawa, Chanute, Iola, Erie and Coffeyville, recently contracted with Burns & McDonnell Engineering Co, Kansas City, Mo., for a complete study of the feasibility of operating all or some of the municipal systems as a pool. The study, to be ready about May, will consider future generation expansion plans with and without an interchange agreement. Need for additional firm power in the near future on the systems is the triggering force behind the proposed pool.

An interconnection at 69 kv is under consideration at the present time, according to Burns & McDonnell. The proposed interconnection linking the six municipals would stretch at least 150 miles from Kansas City, Kan., to Coffeyville on the Kansas-Oklahoma border. The total present generating capacity of the six systems is about 260 Mw, ranging from about 2 Mw in Erie to about 200 Mw in Kansas City, Kan. Collectively the six cities have about 60,000 customers.



HYPOTHETICAL 69-kv transmission line links six municipals studying pool

During the past year two investor-owned companies in eastern Kansas have been negotiating with some of the municipals in the pool group for the purpose of supplying firm and/or peaking power to them. The investor-owned and municipal systems have maintained emergency ties for several years.

R. J. Hayes, Chanute's city manager and temporary chairman of the municipal power pool group, told *Electrical World* that Chanute "will enter into an agreement with no one until the feasibility study is completed." The city of Iola also is reported to have said that it will take no action on any offer from anyone until the study is completed. Hayes also said the pool group has held preliminary meetings with the Southwestern Power Administration to discuss the availability of SPA power to the pool.

Douglas G. Wright, administrator of the SPA, said the six municipals and the SPA had had preliminary talks about the possibility of the SPA supplying peaking power to the Kansas cities. At present, SPA is connected to the Grand River Dam Authority, which adjoins the southernmost of the six cities, by two 69-kv lines. SPA also has 161-kv lines extending through Springfield, Mo., to Clinton and Carthage, Mo., but according to Wright, all these lines have little spare capacity at present.

The future of the pool, however, does not rest entirely on the outcome of the feasibility study or current negotiations. Legislation has been introduced in the Kansas Legislature (House Bill No. 124, by Committee on Public Utilities) that would place the extension of municipally-owned electric facilities outside the municipal limits under the control of the State Corporation Commission.

This bill is said to have been in the formative stage for at least a year. Its principal supporters are reported to be the Kansas rural electric cooperatives, with investor-owned utilities also in favor of the bill. Both cooperatives and investor-owned companies in Kansas are considered to be public utilities controlled and regulated by the SCC. They now operate under mutually-approved rules whereby their facilities and territories may be extended or exchanged subject to SCC approval.

Instances are claimed by the cooperatives where municipal systems in the past have extended their lines to serve cooperative customers. The proposed legislation would require municipals as individual systems to get a certificate of approval from the SCC before extending only those facilities outside the city limits. Thus it would place the municipal systems in these instances under the same rules agreed to by cooperatives and investor-owned companies.

Bill Leaves Pool in Doubt

"Our interpretation of House Bill No. 124," Hayes told *Electrical World*, "does not make it clear that it would permit formation of the power pool. Until the bill is spelled out on this score, the municipal systems will oppose it."

Capitol spokesmen in Topeka feel the bill has a favorable chance of being passed. It was introduced in the House, where members are small business men and farmers traditionally sympathetic to rural interests. It was also introduced by the public utilities committee and not by an individual House member. But it may face rougher going in the Kansas Senate, whose members are not as sympathetic to the rural areas.

Of the cities in the power pool group, two are in or near the service area of Kansas City Power & Light Co. Kansas City, Kan., has for

Power Pool, 69-Kv Interconnection

many years maintained an emergency interconnection with KCP&L capable of handling in excess of 25,000 kw. The city of Ottawa has had an interconnection with the company for more than 30 years. During the past eight years, KCP&L has operated under contract agreement with Ottawa by which either party can obtain emergency service. A firm power agreement was offered when the emergency connection was made but the city declined.

KCP&L has been making studies and negotiating with Ottawa toward the goal of a firm power arrangement. Under proposals now being considered by the city's governing body, KCP&L would furnish firm power to Ottawa as required at a cost of about 7.9 mills per kwhr, including demand charges.

Three of the other municipal systems in the power pool group are in the territory of Kansas Gas & Electric Co, which serves the power requirements of 12 small towns owning their distribution.

The Board of Commissioners for the city of Iola took action on Mar. 10, 1960, authorizing KG&E to investigate the city's electric plant and system to obtain preliminary figures for its purchase should the city decide to sell its electric facilities. KG&E also offered to sell the city of Iola power on a wholesale rate. Commenting on the action, "The Iola Register" reported on Sept. 14, 1960, that "Kansas Gas & Electric can now deliver electricity to the Iola plant on a wholesale basis for 25% less than our fuel cost alone . . . If Iola decides to stay in the electrical generating business, it will have to go in debt $1.5-2 million . . . to take just one more step in keeping our own facilities up to Iola's needs will mean doubling our present investment."

Utility Offers Cities Power

Under its proposed contract KG&E agreed to serve Iola's power requirements over the base load which would have eliminated the necessity of expanding city generating facilities. The proposed rate ($1.50 per kw of billing demand plus 3.1 mills per kwhr for energy, with a fuel-adjustment clause of 0.016 mills per kwhr) would have provided power at less cost than the city could produce it.

KG&E is continuing to make similar offers to other cities with municipal power. Discussions with officials of the city of Chanute were held in November, 1960, and with other cities (not in the power pool group) in February, 1961. KCP&L also has made offers of emergency or firm power to municipals not in the power pool group. Both investor-owned companies have transmission facilities available to or near municipal systems so that they can be tied into integrated systems. Both companies state they have ample power and will make long-term contracts to assure continuous dependable power at favorable rates.

"As a pool," said Hayes, "we should be able to buy large blocks of power at lower rates from investor-owned utilities than has been offered to individual municipal systems. If the private companies can form into interconnections profitably to lower the need for spinning reserve, and to interchange firm and emergency power, then so can municipal systems."

Speaking only for Chanute, he said, "if we could get the type of contract for peaking power we want, we would not be adverse to buying it from other sources."

Texas Companies Plan 800-Mile, 345-Kv Line

An 800-mile, 345-kv transmission line that will link Houston, the Dallas-Fort Worth area, and the Permian Basin in west Texas has been announced by investor-owned Texas electric companies. According to C. A. Tatum, president of Dallas Power & Light Co, the line will connect 27 steam electric plants with more than 6,500-Mw capacity, making it one of the nation's largest and strongest reservoirs of power.

One segment of the plan is a $25-million, 345-kv line, stretching some 250 miles from Houston to the Dallas-Fort Worth region, and linking the North and South Texas Interconnected systems. At one end is Houston Lighting & Power Co, with a present capability of about 2,900 Mw, and interconnections with Central Power & Light Co, the Lower Colorado River Authority, and other utilities along the Gulf Coast. At the other end of this 250-mile link is Texas Power & Light Co, which is solidly connected with Dallas Power & Light and Texas Electric Service Co, the other two operating companies in Texas Utilities Co, to form a system with about 3,685-Mw.

The 250-mile, north-south line, all on steel towers, will be built initially as a single circuit line, but there will be tower space for another circuit when required. The 795-MCM ACSR bundled conductor will provide an inter-area capacity of about 500 Mw.

The over-all plan, of which the north-south link is a part, will include a 300-mile extension of the 345-kv system to west Texas by Texas Electric Service and a 70-mile run to north Texas by Texas Power & Light. The first part of the connection westward from Fort Worth is under construction. Major parts of the plan will probably be in use in 1963.

Commenting spontaneously on the Texas plan, Douglas G. Wright, administrator of the Southwestern Power Administration, told *Electrical World* that he is urging additional heavy transmission construction from the Texas system to the SPA area and then north to the Kansas City area, to Omaha, and ultimately, the Missouri Basin. Wright is also urging construction of a similar line from SPA territory eastward to the Tennessee Valley Authority service area.

Atomic Energy Hearings End

One project falls by the wayside during hearings because of site safety and cost considerations by AEC

The Joint Congressional Atomic Energy Committee, concluding its annual hearings on the state of atomic research, has heard encouraging testimony on two reactor projects. But a third was canceled by the Atomic Energy Commission even as it was being discussed at "Section 202" hearings.

AEC canceled the Small (22-Mw) Size Pressurized Water Reactor (SSPWR) after two years of negotiations with public power groups for joint participation in the project. Contract negotiations had narrowed to two possible reactor operators—City of Jamestown, N. Y., and Dairyland Power Cooperative of LaCrosse, Wis.—before AEC turned down sites proposed by the two bidders as unsatisfactory from safety and cost viewpoints.

AEC's termination order came shortly before Mayor Carl F. Sanford of Jamestown outlined for the Joint Committee details of three sites selected by the city for the SSPWR.

Sanford concluded that "unless a reactor of this capacity may be safely located within a city of our size, it has no practical value to any electric system, and we therefore recommend that it be abandoned in favor of the extremely large reactors which might be located in completely isolated areas and from which transmission lines would not prove to be a prohibitive cost."

Bid Comes Before Criteria

Merrill Smedberg, head of Jamestown's power department, described a municipal power need of 20,000 additional kilowatts by 1970. Sanford said city officials never would have submitted an SSPWR bid, had they been better acquainted with AEC site safety criteria. The city spent $10,000 on the project.

Rep Chet Holifield (D-Calif.), Joint Committee chairman, said that clearcut criteria—since issued by AEC—could have saved Jamestown and other public utilities a good deal of trouble in this case. But he upheld AEC on site safety recommendations.

On the other hand, reactor manufacturers reported that sufficient research-development results have now come in on low permeability graphite-clad fuel elements to allow a satisfactory decision by the AEC Advisory Committee on Reactor Safeguards for the Peach Bottom, Pa., High Temperature Gas Cooled Reactor. This was the statement of Frederick DeHoffman, president of General Atomic Division of General Dynamics, the reactor builder for Philadelphia Electric Co.

Peach Bottom sponsors are to journey to San Diego this month, DeHoffman said, for a meeting on the latest showings of General Atomic's research - development program. He said this trip should enable AEC to issue a construction permit—thus far holding back the project.

Yankee Low Cost Is Encouraging

Probably the best news at the hearings concerned the low plant costs of the Yankee Atomic Electric Co's Pressurized Water Reactor at Rowe, Mass. Charles Weaver, vice president of Westinghouse Electric Corp, said final cost of plant, core and startup operation will be under $50 million as compared to first cost estimates of $57 million.

This means Yankee nuclear power costs will be $339 per installed kw when the core (provided by the government under 4% use charges) is removed from the cost. From these figures, nuclear costs projected for the similar but full-scale Southern California Edison Co 375-Mw gross nuclear plant—more than three times greater than Yankee's 110-Mw capacity—are expected to be a respectable $220 per kw. The latter cost approaches competitive fossil fuel levels for the Southern California area.

The good news and bad news regarding reactor construction pretty well reflected opposing views heard throughout the hearings. The civilian nuclear power program is lagging badly, in the opinion of some, and doing fine, according to others.

William J. Clapp, president of Florida Power Corp and chairman of the Edison Electric Institute atomic power committee, vigorously defended the government's partnership approach with industry in building nuclear power plants.

He pointed to the recent full-power operation of the Yankee reactor and the approaching operational date of Consolidated Edison Co's Indian Point reactor as proof that the "broad and diversified" partnership program is sound.

Altogether, investor-owned utilities are engaged in 17 nuclear power projects, Clapp said, that will involve private investment of about $700 million and add up to some 2,000 Mw of capability by 1962-3.

Labor Asks Federal Development

On the other side, organized labor representatives pressed for renewal of a Gore-Holifield type federal program for development of competitive nuclear power involving all the conventional reactor types.

Jack Curran of AFL-CIO's legislation department said another year had passed without the creation of a progressive and vigorous national nuclear development policy. With the change in administration and assumption of Joint Committee chairmanship by Holifield, Curran said, the AFL-CIO "can hope for progress in 1961 with more conviction than at any other time since the 1954 Atomic Energy Act became law."

Will Back Legislation

His statement that labor would back another Gore-Holifield bill was backed by a similar pledge given by Leo Goodman, atomic energy advisor to Walter Reuther.

Goodman joined those in the hearings who said the development of nuclear electrical generating capacity by the industry-government cooperative power program failed to reflect the urgency which responsibilities of world leadership demand. He blamed a slackening tempo of nuclear programs on Russia's de-emphasis of peaceful atom programs.

News Scope

PUMPED STORAGE PLANNED—A new pumped storage project, using Lake Michigan as one of its reservoirs, loomed as a possibility as Consumers Power Co announced that it was acquiring options on a site near Ludington, Mich. The proposed project would include an artificial reservoir about 300 ft above the lake. At present, the generating capacity and the size of the artificial reservoir have not been determined. Utility spokesmen said that there are no plans for immediate construction.

OKAY G&T CO-OP PLANS—East Kentucky Rural Electric Cooperative Corp has gotten a green light from the Kentucky Public Service Commission on plans to build a 100-Mw steam plant, financed by a $25-million REA loan. The co-op also got authority to build about 315 miles of transmission line and six substations. The proposals had been opposed by Kentucky Utilities who said that the co-op could save millions of dollars by postponing construction and buying power from KU.

NEW BID—Despite two rejections, Robert Moses, chairman of the Power Authority of the State of New York, has again asked Gov Rockefeller and the legislature to let PASNY participate in atomic development. A previous request was turned down by the state's Office of Atomic Development on Feb. 5.

SUBSTATION BLAST—Two men were killed and service to 27,500 customers was interrupted by a short on the 4,800-v bus of an enclosed cubicle at the Norwalk sub of Connecticut Light & Power Co. Two other men were injured. The accident occurred in a grounding operation at the switchgear position prior to installing a new circuit. About 20,000 customers were restored to service in one hour; the others, over a six-hour period. An investigation is in process.

Dateline . . . Dallas (*Continued from page 5*)

talked, the wrinkles in their foreheads became deeper as they realized that their favorite topics of conversation were of their past.

A reporter, sensing this concern, asked the tough questions: Do you think that your own sons will feel the same way you do about rural electric co-ops? Will they take up where you leave off?

The answers varied slightly from person to person: "That's a big worry," answered a North Dakota co-op director. "The younger generation can't realize what we've been through to get electricity on the farm. They've always had it and think it was always there." Then he became more specific: "Two of my sons have left the farm, so they don't have to worry about the co-op. The one still on a farm seems much more concerned with other pieces of field machinery. Oh, he's interested in the co-op, I suppose, but it's hard to get him to come along to a meeting."

Another director—this one from a Southern state—seemed even more resigned to the future, "Honestly I don't know how we're going to interest the younger generation. They think all you have to do to get electricity is pay the bill."

When they talked of today's problems—the suburbs moving out to take over vast area of farmlands, the investor-owned companies taking in former co-op customers, the need for new types of equipment—some of the old fight and the old fire returned to these co-op directors. They seemed to favor the bold action, the fight to keep their own, the battle for their independence. Their voices were strong as they advocated a course of action, and their votes in the general session were predictable. Yet, the more seasoned observer couldn't help but wonder if these actions were not as much from habit as from conviction.

But while the older directors weren't sure whether their sons would follow in their footsteps, many of them took a fatherly pride in their own co-op managers. "We were mighty lucky to get him," one North Carolina director bragged of his new co-op manager. "Our manager knows what's happening and he's on top of his job," boasted a Wisconsin director. "He knows what service means. His men move fast when there is trouble," said a Texas director in referring to the manager of his co-op.

Talks with a few of the managers disclose that the respect is often mutual. They have a high regard for the experience and the advice of their boards of directors, even though the managers do admit a little impatience at times.

The managers, many of them in their early or middle forties, see the co-ops as demanding, going businesses and have little time for the historic niceties. "We've got a red-hot range campaign going," says a Southwesterner as he launches out on his various sales activities. "We're organizing a presentation to the legislature to try to lick this service area problem," begins another. Their jargon is the business idiom. Their pioneering is in new techniques, new presentations, new sales campaigns, new public relations efforts.

The older directors can understand and support the general policies, approve the larger expenditures, and generally oversee the business. But they don't see how it can be called "pioneering."

T & D Group Argues Transformer

Philadelphia session considers transformer loss ratios, and the economics of application of conventional, CSP and modified CSP transformers; hears of stormproof distribution

The economics of distribution transformers, their proper loss ratios, and the comparative merits of the CSP, conventional and modified CSP types under particular system conditions, came in for a thorough airing before the recent meeting of the Edison Electric Institute Transmission & Distribution Committee at Philadelphia.

From the meteorological standpoint, at least, the two-day session was storm-tossed. It took place as one of the worst blizzards in recent history smothered Philadelphia in drifts. Snow-bound speakers missed their appointed spots causing repeated revisions in program, but all eventually fought through and delivered.

Sharing the spotlight with transformer topics were reports on: storm-proof distribution designs, ac-network operation, 240/480-volt distribution, a unique fast-throw-over system for special network loads of high outage sensitivity.

Propose 2:1 Loss Ratio

A proposal that the copper-to-core loss ratio of 2:1 be made standard for all distribution transformers was advanced by W. H. Johnson and W. B. Mekolites of American Electric Power Service Corp. Their case was based in part on the grounds that a 7% decrease in first cost of the 2:1 ratio design would permit economical elimination of the 15, 37.5 and 75-kva transformer ratings.

They showed that a 2:1-ratio, 25-kva transformer when loaded economically will produce savings that average $1.20 per year more than a 3:1 ratio design, for an annual growth rate of 3%. However, as matters stand today, they said, there is no economical justification for eliminating any size transformer of either design, 2:1 or 3:1. Johnson and Mekolites also said that the break-even load of a 10-kva transformer for the two designs is 10.9 kva; for a 25-kva size, 29.0 kva. Below these values, they said, the 3:1 ratio is more economical while above these values the 2:1 ratio is preferred.

From loss ratios discussion turned to comparison of distribution transformer types—conventional, CSP and modified CSP. Three points of view were expressed. The case for the conventional over the CSP was advanced by W. S. Wilder, Wisconsin Electric Power Co. He explained that his company does not use branch line fuses on 2.2/3.8 kv. Consequently, the only factor limiting the maximum size of CSP transformer is feeder breaker relay characteristics. This fixes maximum allowable protective link size at No. 10, used in a 37.5-kva transformer. A larger link would not coordinate with standard relay setting. On the basis of cost, Wilder said, estimates show that the installed cost of the conventional transformer is less than the CSP for the 37.5-kva size. This left the 25-kva CSP as the only size that is both cheaper and compatible since no sizes smaller than this are purchased at this voltage. Similarly, on 4.8/8.3-kv feeders, only a 10-kva CSP could be justified.

R. G. Steiner, Union Electric Co, on the other hand, said that an analysis of costs by his company justifies use of CSP transformers. He gave examples of 37.5-kva, 2.4-kv and 25-kva, 7.2-kv, single-phase installations in which annual savings of $4.92 and $8.05 respectively were obtained. Cost elements included were investment in equipment, installation cost, taxes, interest and amortization, and operating and maintenance costs.

Steiner said a study of transformer load characteristics showed that CSP units would not only protect the windings from burnout by short circuit or overload, but with the signal-light in operation, permit utilization of overload capacity.

Speaking for the modified CSP transformer was E. N. Dye, West Penn Power Co. He explained that the modified CSP is a single-bushing unit with an external arrester and an internal protective link in the bushing but no secondary breaker. Its modifications were adopted to reduce cost on West Penn's largely rural system, where secondary exposure is limited, Dye explained.

Failure rates for the modified units are about half-way between the conventional transformer because the failure rate as well as the installed cost of conventional units is higher than that for the modified CSP. For a 5-kva unit, the net cost differential between the modified and standard CSP favors the modified unit by about $12. Because the rate of failure of the modified units is satisfactory and this cost differential exists, West Penn will continue to order the modified units, Dye concluded.

New Starting Current Rules Urged

A draft of recommendations on proposed motor starting current rules leading to industry-wide permissible motor starting currents was presented to the Committee by J. W. Anderson, Philadelphia Electric Co. Previous publications have become obsolete, he noted, because of the increase in size and number of motor-driven appliances and equipment now available and because of the major increases in distribution system capacity made by the utility industry. The proposals, the work of the AEIC-EEI-NEMA Joint Committee on Motor Starting Currents, require only approval of the Committee's parent bodies, Anderson said. Preliminary endorsements have already been given.

A "new look" storm-resistant, 4-kv, overhead distribution design (EW, Feb. 6, p 57) was unveiled by G. A. Ewald, Public Service Electric & Gas Co. Its principal objective was a more storm-resistant system, consistent with prudent expenditures, Ewald said. But the result has also produced an improvement in appearance by permitting shorter poles and eliminating crossarms. Working conditions on poles are also vastly improved. This should tend to both increase productivity and lessen the hazards normally associated with overhead line work, Ewald explained.

Economics

All series street lighting has been eliminated, and about 5 million conductor feet of No. 6 copper wire removed. There are now about 80,000 multiple street lights, approximately 43% of the total. Conductor for 2.4/4.1-kv primaries had been bare, weatherproof and tree wire in many sizes. The new standard for single-phase primary is high-strength tree wire, nominally 4,000 lb minimum, installed on pole-pin brackets. No. 1/0 AAAC has been used initially, and other conductors are under consideration.

New 3-phase primaries are fully insulated, factory lashed aerial cable at substation outlets, in congested locations, along residential rear-property lines, and where tree conditions create excessive hazards. Spacer cable is used at other locations. The present proportion of spacer to lashed being about 2:1 in the small size (2/0 aluminum) and 6:1 in the large size (397.5-MCM aluminum). Secondaries and service drops are also improved.

Although a majority of EEI member companies have found the proposed new EEI-IPCEA standards for No. 4 aluminum overhead service cable acceptable in a recent survey, utilities that use such cable in large quantities have objected to its adoption, F. G. Josberger said in reporting to Committee. Some 49 companies (74% of the 66 utilities answering the survey) approved the standard; ten objected; seven non-users did not vote. Josberger, who is chairman of EEI representatives on the joint committee, said each of the 49 companies voting approval uses an average of 735,000 ft of cable, while the ten who voted to reject use an average of 1,850,000 ft each.

There has been a healthy growth in the size and number of ac networks. This was seen in a report on ac network operations for the years 1956-1958 given by D. F. Tullock, Boston Edison Co. Among the 65 utilities surveyed, 48 operate 464 networks with an installed capacity of 12 million kva and supply a peak load of 6.3 million kw. This is 1.2 million kva more capacity and 1.0 million kw more load than

(*Continued on page* 88)

As blizzard roars outside . . .

T & D group studies transformer trends . . .

and hears report on engineering education

Sterlington Computer Proves

Two years' experience at Sterlington shows the way for full plant computer control

CHALMER E. JONES, Vice President and General Manager, Control Systems Division, Daystrom Inc, La Jolla, California

W. T. HESS, Vice President and Chief Engineer, Louisiana Power & Light Co, New Orleans, Louisiana

Use of electronic computers in the operation of generating units today is being justified by:

1. Effecting savings through reducing the probability of serious accidents, i.e. faster information gathering allowing quicker decisions.

2. Increasing unit reliability through the quick alerting of dangerous conditions.

3. Providing better information on plant operation and on the need for preventive maintenance.

Added to a new unit and an already established unit in 1958, the on-line electronic computer installed at Sterlington Station of Louisiana Power & Light Co:

- Monitors all important components of the power generating unit.
- Makes conventional computations based on this data.
- Presents human operators of the unit with information on the basis of which they could make their decisions.

This data collection and information system has been used to test essential elements, and to pave the way for the computer control of power plants. A fully automatic computer control system will be placed in service in early 1961 at the Little Gypsy Station near La Place, La.

One of the basic reasons for computer control of power plants was the feeling that some means of getting around foreseeable limitations on human personnel are necessary as the size and complexity of modern electric systems increased. Today as generating stations become larger and more intricate, improved methods of operation are necessary, primarily to prevent machine failures and damage arising from human vagaries.

Table I—System Inputs

Kw, kvar, amps, volts,
Cycle pressures, flows, and temperatures
Fuel gravity and heat content
Equipment pressures, flows, bearing and metal temperatures

Table II—Data Logged Hourly

Temperatures	Pressures	General
Fuel gas	Fuel gas	Fuel gas flow
Feed water	Throttle steam	Fuel gas specific gravity
Throttle steam	Fuel gas burner	Fuel gas content
Condenser inlet circulating water	Turbine bearing oil	Generator Mwhr meter
Turbine exhaust steam	Turbine hydraulic oil	Auxiliary and standby auxiliary Mwhr meters
Air to each air heater	Generator hydrogen	Generator field current
Air from each air heater	Condenser steam	Generator field voltage
Fuel gas from each air heater		Generator Mw load
Two front and three rear points on turbine thrust bearing		Generator current
Turbine lubricating oil outlet on oil cooler		Generator voltage
Ambient air		

Table III—Points Continuously Scanned

144 thermocouples including those for turbine generator bearings, generator rotor, bearings on boiler feed pumps, and the motor and pump and the main, auxiliary and standby transformers

Table IV—Data Computed, Averaged, or Totaled Daily

Generator Mwhr
Auxiliary transformer Mwhr
Fuel gas flow
Fuel gas pressure
Fuel gas heat content
Fuel gas specific gravity
Feed water temperature average
Main steam temperature average
Reheat steam temperature average
Throttle steam pressure
Unit net heat rate

Prevents Accidents, Saves $100,000

The Sterlington system has already achieved two of its goals. In the first place, it has already effected substantial savings through the prevention of accidents. In one instance, for example, it alerted operators to the danger of overheating bearings in two large boiler feed pumps, a vacuum pump and an air compressor. It did so in time to enable operators to forestall trouble and prevent damage that would have totaled more than $100,000.

In the second place, it has proven the dependability of electronic computer control. The guarantee of a 99% operating availability of

Savings and Reliability

the system was actually bettered in the six month qualifying test. After two years of utilizing the system only to scan, log and process information, it was turned into one for limited control in the spring of 1960. This was done by closing three minor, troublesome loops: the control of the stator oil temperature, hydrogen temperature and lube oil temperatures. The computer control system to be installed at Little Gypsy will include a duplicate of the original system in use at Sterlington, as well as additional solid state equipment required to effect control, including startup, shutdown, and emergency shutdown as well as normal operation at optimum efficiency.

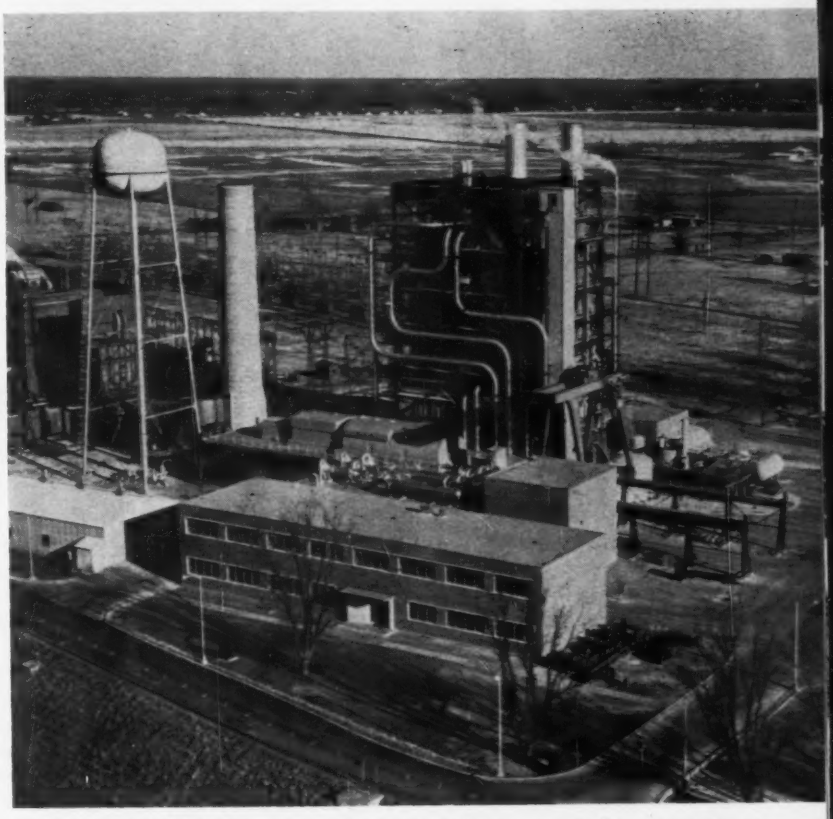
300 Points Required

To determine the number of points which would provide useful information and might, therefore, be scanned, a survey was made of the two units at Sterlington. About 300 such points were required. Weighing the cost of standby equipment at each point against the convenience of having them covered electronically, it was finally decided to scan only 250 points for abnormal conditions, at the rate of five points per second, and to log readings of 100 variables at scheduled times.

However, in order to leave room for picking up some readings when control loops were closed, the specification called for a potential of 350 points. As experience and confidence increased, additional points were, in fact, picked up from conventional instrumentation.

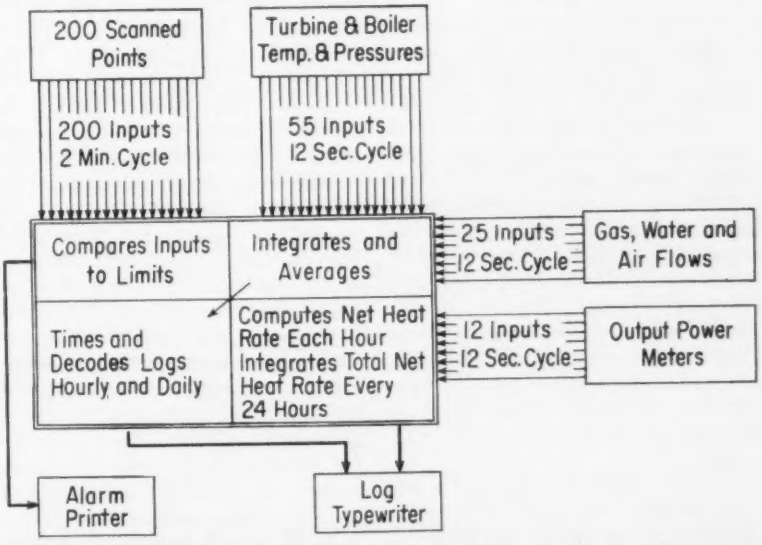
Tables I through IV summarize the data that is processed—system inputs, logged, scanned and computed data as well as the frequency at which such data is handled.

This information is processed in two ways. First of all, it is automatically compared to pre-set standards which are stored in the computer memory. If any measurement is out of line an alarm is shown on an annunciator in the control room. Simply by throwing a switch at the side of the control board, the operator can cause to be printed the location, time, reading



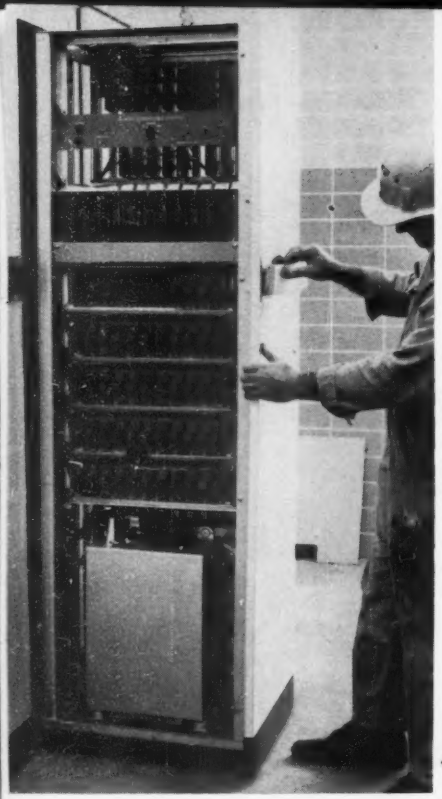
STERLING STATION of Louisiana Power & Light Co uses on-line computer to monitor major components, make computations, and inform human operators

Inputs and Outputs of Sterlington's Information System


200 Scanned Points
200 Inputs 2 Min. Cycle
Turbine & Boiler Temp. & Pressures
55 Inputs 12 Sec. Cycle
Compares Inputs to Limits
Integrates and Averages
25 Inputs 12 Sec. Cycle
Gas, Water and Air Flows
Times and Decodes Logs Hourly and Daily
Computes Net Heat Rate Each Hour Integrates Total Net Heat Rate Every 24 Hours
12 Inputs 12 Sec. Cycle
Output Power Meters
Alarm Printer
Log Typewriter

STERLINGTON'S INFORMATION SYSTEM scans 200 points every two min, reads 92 points every 12 seconds, and times, logs, and computes hourly and daily

INPUT-OUTPUT EQUIPMENT uses typewriters to enter instructions into memory and to log output while board above typewriters shows register on computer



EQUIPMENT associated with the computer consists of Memory Operational Control Box and sensing amplifiers with solid core memory at bottom of cabinet

and limits of the variable. He then makes a manual adjustment to return the variable to normal.

Second, after processing through the computer, the information is printed out as (a) a guide to the decisions of the plant operator and (b) an historical record.

System Specified

Engineering specifications required that the system:

1. Log all information which is scanned continuously and accurately and print it out either at regular intervals or upon request. The data to be logged are collected and punched on paper tape at the same fundamental rate of five points per second. Upon completion of print-out, the system immediately returns to its scanning functions while the perforated tape is routed through a tape reader and logged data are typed on pre-printed log sheets at a rate of one point per second. The logging cycle includes the time of day and accuracy check besides the readings of logged variables.

2. Give an alarm when any points are found to be running below or beyond pre-set limits. At the presence of an alarm signal, the Trouble Location Annunciator (TLA) energizes an audible alarm to draw the operator's attention to the condition. Simultaneously, the associated equipment window of the TLA is continuously flashed. Acknowledgment by the operator terminates the audible signal. "Flashing reset" by the operator terminates flashing, but the equipment window remains illuminated as long as the abnormal condition exists. "Return to normal" measurement of the signal extinguishes the window lamp. This signal is unique for each TLA window.

Each TLA window further is representative of a functional group of scanned points to indicate the portion of major equipment in trouble. The identification is printed with associated code numbers on the translucent TLA window. The alarm printer is also actuated by an abnormal condition. It prints the point identification and the value of the scanned point. Point identification will be printed for each scan cycle as long as the abnormal condition exists. At the end of each scan cycle the alarm printer will print time, if an alarm has occurred during the scan cycle.

3. Make all necessary computations on this data and register results in such a manner that the plant's human operators can see quickly and clearly what they should do—what operations call for their attention.

Equipment Specified

One of the major problems in designing an information system is that of reliability—not only in terms of continuous operation but also in continuous accuracy and stability of operation. A number of requirements were stipulated in order to provide the required degree of continuous operation:

1. De-rating of components well beyond their proven history of reliability. All input and output specifications were extended by several percentage points beyond the anticipated range of variation. The specification called for the computer to accept $\pm$ 5% input line variation and the equipment actually accepted $\pm$ 10%.

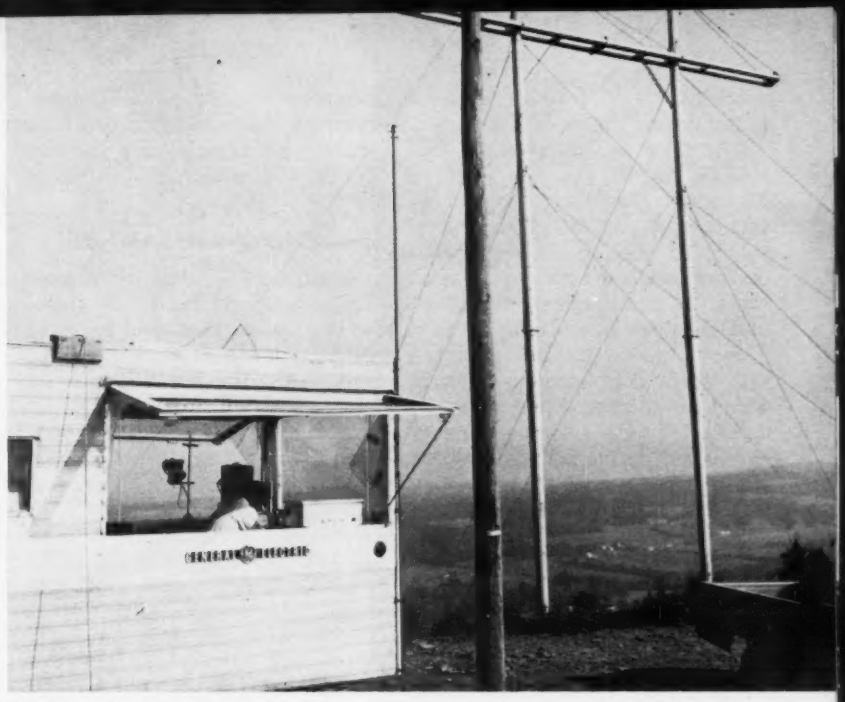
2. Solid state devices, such as transistors and diodes, are used as far as possible. In input switching of low-level signals, hermetically sealed relays with mercury wetted contacts were used to meet the stability and no noise demands of the system.

3. Virtually eliminated moving

(*Continued on page* 88)

Penelec 460-Kv Line To Collect Lightning Surge Data

Field data on lightning current amplitudes and waveshapes, collected with conventional and newly-developed instrumentation, aims toward predicting line performance



TRAILER EQUIPPED WITH SPECIAL INSTRUMENTS determines stroke location, current and voltage of surges, electric field intensity, and number of strokes

D. J. HELLER, Field Instrumentation Engineer, Transformer Dept, General Electric Co, Pittsfield, Mass.

S. J. POLASKI, Junior Engineer, Pennsylvania Electric Co, Johnstown, Pa.

The 460-kv transmission line which Pennsylvania Electric Co has recently energized is instrumented to provide data on:

- Wave shape and amplitude of lightning stroke currents.
- Relationship between strokes to the line and the local isokeraunic level.
- Phase conductor voltages created by tower or ground wire strokes and nearby strokes to ground.
- Probabilities of shielding failure for various conductor heights and shielding angles.
- Effects of footing resistance.

This data will be correlated with that gathered by the General Electric Co's Project EHV which was recently energized at 720 kv.

The varied horizontal configurations of the line, together with the type of terrain it traverses and its relatively high isokeraunic level (38-40 thunderstorm days per year), provide an excellent opportunity to understand the mechanism of lightning tripouts on extra-high-voltage systems. Four configurations of single and bundle conductors were used to string the line on a phase spacing varying from 24 to 43 ft. The line is strung on 14 types of structures (5 wood pole and laminated wood, 3 steel, and 6 tubular steel) of heights varying from 60 to 130 ft and widely varying shielding angles. In addition, the tower footing resistances vary from 22 to 250 ohms.

The Penelec 460-kv line traverses two steep ridges—Dunning Mountain on the western end and Tussey Mountain on the eastern end—with a broad valley between the ridges. From the crest of Dunning there is a clear view of most of the transmission line, extending as far as Tussey, as shown in Fig 1. The main measuring station is in a

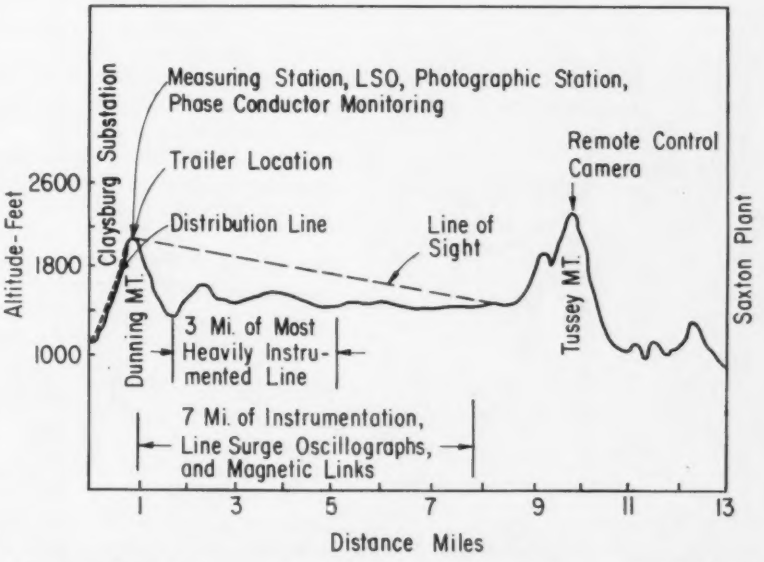


FIG 1—FIRST 7 MILES of line is instrumented with Boys camera, conventional still cameras, Pierce lightning counters, magnetic links, and line surge oscillographs

specially equipped trailer adjacent to the line on the crest of Dunning.

The main measuring station will monitor the 3-phase conductors for surge voltages at this point by means of capacitive pickup plates suspended beneath the phase conductors and connected by shielded cable to conventional high-speed oscilloscopes inside the trailer. These oscilloscopes are equipped with automatic recording cameras which advance the film at predetermined intervals to prevent fogging as well as after any oscilloscope sweep is triggered by an incoming surge. This station also serves as the major photographic vantage point because of the excellent view of the line obtained at this point.

The photographic program has two purposes: **First,** to pinpoint actual stroke locations so that the full biography of a measured stroke may be reconstructed. An additional still camera, located on Tussey for the same purpose, will be operated by remote control. **Second,** high-speed and slow-speed Boys-type cameras are also to be used to gain additional data on the composition of strokes, for instance, the number of current peaks.

Additional instruments at the main measuring station are electric intensity strip-chart recorders and Pierce lightning counters. This station is also equipped as an electronic repair shop for the instrumentation on the line. Complementing the voltage measuring activities at Dunning are the current measuring devices used along the line.

Special Instruments Developed

A special line surge oscillograph (LSO) was specifically developed for this investigation and for Project EHV. This is a self-contained oscillograph designed to display the wave shape and amplitude of the lightning currents to the ground wires. These wave shapes are displayed on a one-inch diameter cathode-ray tube and recorded on 16-mm movie film moved continuously past the lens. The instrument is turned on automatically by the electric field build-up caused by a charged cloud in the vicinity. The oscillograph remains on for the full period during which a stroke may reasonably be expected and then automatically turns itself off to conserve its battery power supply. This instrument will operate for 48 hr of storm conditions before camera servicing or battery charging is necessary.

To provide a signal that reproduces the wave shape of the stroke accurately, two types of transducers were developed in the laboratory and applied on this project.

The first type is a coaxial current shunt connected between the overhead ground wire and the tower and is used on all instrumented metal structures.

The second type is a resistance loaded air core current transformer that measures the current passing to ground through the ground wires of the instrumented wood structures. These two types of transducers are shown on Fig 2.

It is important that the transducer provide the LSO with the current wave shape of the lightning stroke so that the relationship of induced phase conductor voltages to stroke current amplitudes and wave shapes may be constructed. At the present time, no data is available showing this relationship.

The ability of this relatively inexpensive oscillograph to sense approaching storms, take fractional microsecond data, and conserve its own power, makes it ideal for this type of application.

Eight of the oscillographs are located on the two mountain peaks and their immediate slopes, since there is a higher probability of strokes to these regions. The remaining 27 oscillographs are placed strategically throughout the valley.

The entire eight-mile section between the two mountain peaks is instrumented with magnetic links to record the crest current passing through the structure to ground.

After the preliminary line design had been completed, a series of

(*Continued on page* 94)

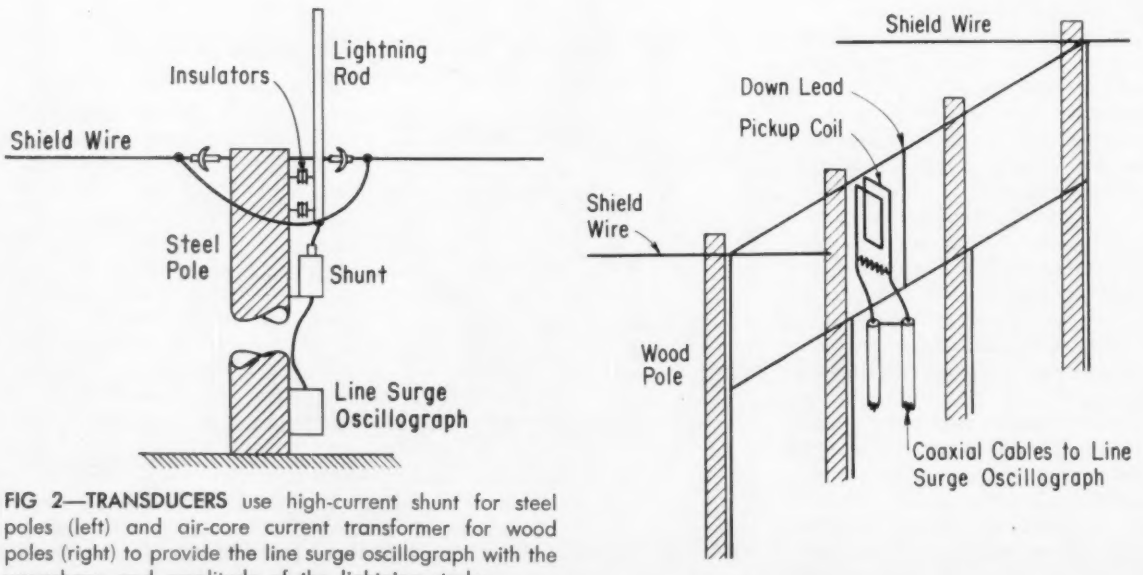


FIG 2—TRANSDUCERS use high-current shunt for steel poles (left) and air-core current transformer for wood poles (right) to provide the line surge oscillograph with the waveshape and amplitude of the lightning stroke

SPACER CABLE in residential subdivisions wins approval of public. Installation has No. 2 compact ACSR conductors with 10/64-in. polyethylene insulation and Alumina spacers. Tree-trimming is thereby reduced

Trim Up Distribution Pole Lines

Spacer cable, 'harness' secondary leads for transformers, triplex services and triplex secondaries give neater appearance to lines

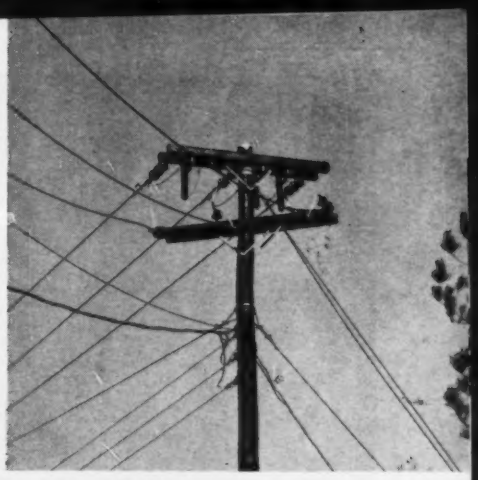
W. B. PROFILET, Division Engineer, Mississippi Power & Light Co, Jackson, Miss.

Growing public consciousness of the appearance of distribution facilities prompted Mississippi Power & Light Co to revaluate its construction practices and a number of changes have been made with gratifying results. Analysis of customers' attitudes toward distribution facilities indicated objections to these features:

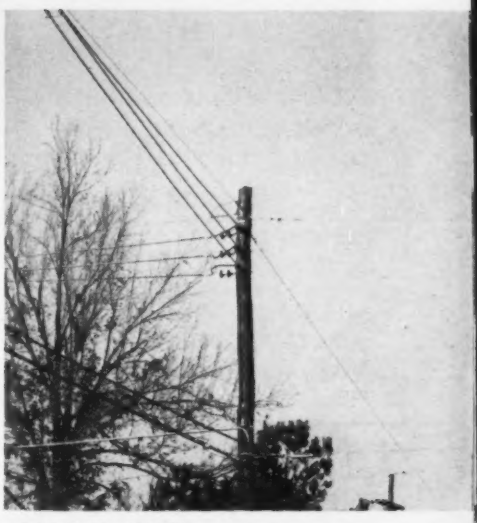
1. Poles and diverse items on poles, such as crossarms, transformers, guys, and wires.
2. Tree-trimming to clear conductors for safe and serviceable operation.

Initial corrective efforts were slanted toward improvement in the arrangements of attachments to the poles to provide less bulk and more symmetry of arrangement. New conductors and new conductor arrangements offset some of the need for excessive tree-trimming. The better looking jobs usually turned out to be more economical and provide a better service to the customer.

Mississippi P&L is particularly enthusiastic about spacer cable. Although it has not been used extensively, enough has been installed for the company to find that customers like it. An accompanying photo shows a 3-phase, 13.8-kv circuit along a street having rather dense shade-tree plantings. The conductor is No. 2 ACSR Compresto with 10/64-in. polyethylene insulation. Spacers are Alumina. The installation of conventional open-wire primary on crossarms



DEAD-END POLES presented cluttered spectacle, arousing public's ire



DEAD-END POLES become trimmer when spacer cables replace open wire

POST-TYPE INSULATORS bring extra primary phase through treed areas

SECONDARY HARNESS improves appearance of 3-phase transformers installation and can be shaped in storeroom before hoisting and assembly on pole

STREAMLINED TRANSFORMERS and vertical primaries give 3-phase service

would have involved "butchering" the trees.

A 3-phase, 13.8-kv feeder has been built through a high-class residential subdivision. The conductor is 336.6-MCM all-aluminum, with 10/64-in. polyethylene insulation and Alumina spacers.

Limited use of this conductor and insulation has been extended to residential subdivisions where the standard ridge-pin construction is normal, and tree-trimming for proper clearance always a problem. With this construction, it has been possible to reduce tree-clearance costs and straighten lines, thereby reducing guys and anchors.

Proof of public acceptance of spacer cable type construction has been the permission granted by the State Highway Department to install a 336.4-MCM spacer cable along one main highway entrance to Jackson. Formerly, the department had suggested that the line go "underground." Permission for the overhead construction was secured after the highway engineers came to see the installation.

Attention has been directed also to improving the appearance of overhead transformer installations by changing the secondary lead arrangement of relatively large transformer banks. On cluster-mounted transformer banks the secondary leads are bundled and trained back to the cluster mount bracket just above the secondary bushing level. There they are fastened to secondary insulators on the cluster bracket. A "secondary harness" type of installation, serving a 54-unit apartment building, is shown. Feed-through current transformers on a piece of channel iron below the transformers facilitate metering.

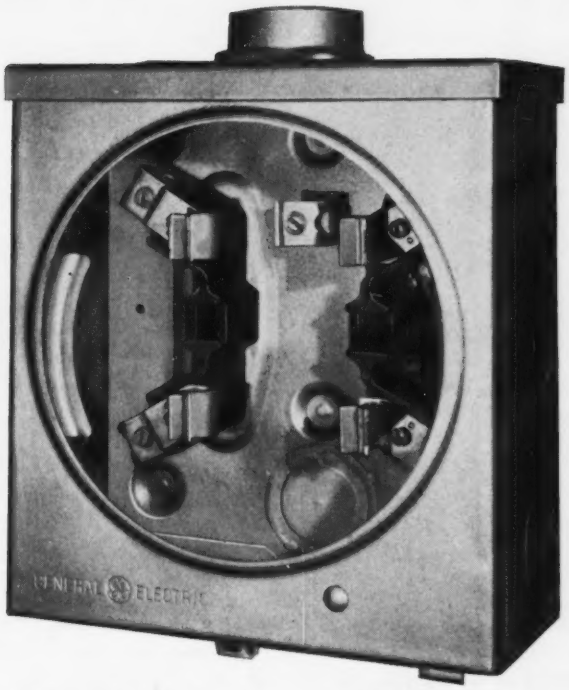
Such transformer installations are made up on the ground and raised as a unit to position on the pole. Since so much of the work is on the ground, installation takes less time than conventional installation.

Another improvement resulted from the installation of a junction box underneath a transformer platform for the termination of several underground service conduits. All leads were brought together and made up in the box, instead of being terminated with service entrance heads and the usual jumble of wires and connections.

In some instances customers were willing to pay the difference in cost between overhead and underground facilities, and underground equipment with pad-mounted transformers was installed in new residential areas.

(*Continued on page* 88)

CABLED SERVICE to a riser on a low-roofed building made support problem simpler and constitutes clean, modern appearance in new residential subdivisions



NEW Low-Price SI-60 Ringless Sockets

General Electric announces . . . another new line of sockets, the SI-60 for 100- and 200-amp services. Meets requirements of AEIC-EEI-NEMA standards for meter sockets. *Ringless Weatherproof Construction* provides maximum protection. And, G.E.'s new SI-60 line offers exclusive features never before available in a ringless design. *New Terminal Block Assembly* with exclusive one-piece combination jaw and connector strap increases reliability . . . permits an unbroken current path from meter blades to line or load wires . . . provides excellent electrical conductivity with low heat rise. *New Plug-in 5th or 6th Terminal* simplifies shop or field conversion . . . installs in seconds, without the use of tools.

New General Electric Line of SI-60 Sockets also feature 16-gauge zinc-coated steel*. *Die-cast Hubs,* of corrosion-resistant aluminum . . . available in all popular hub sizes up to 2½-inches. *Lay-in Wire Connectors* accommodate either aluminum or copper wire. *Concentric Knockouts* are on both sides, back and bottom; for 1, 1¼, 1½-inch conduit. Your choice of *Large Case Size*—3 sizes in 100-amp, 2 sizes in 200-amp—permits fast, easy wiring.

NOW AVAILABLE in 100- and 200-amp ratings. Available soon with manual by-pass. Contact your G-E Sales Office or authorized G-E distributor for full information. Or write General Electric Co., Somersworth, N. H.

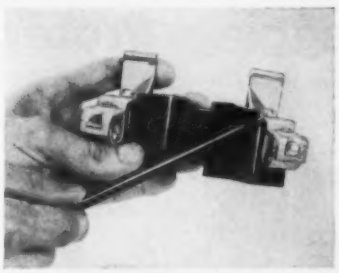
* *Also available in aluminum.*

711-02

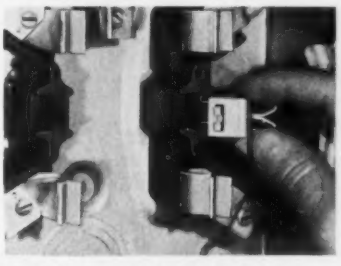
METER DEPARTMENT

GENERAL ELECTRIC

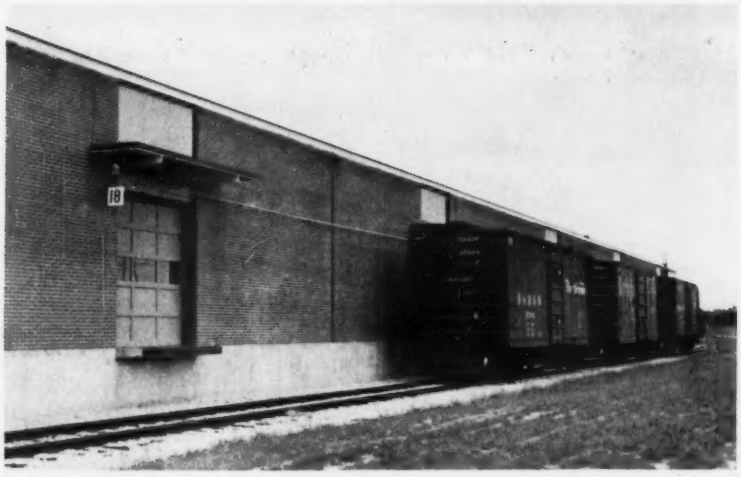
WEATHERPROOF RINGLESS CONSTRUCTION meets AEIC-EEI-NEMA standards. Case is 16-gauge zinc-coated steel with oven-baked finish. Hubs are die-cast of aluminum; staked to case for rigid, weatherproof fit.



EXCLUSIVE ONE-PIECE combination jaw and connector strap—in new terminal block—permits an unbroken current path from meter blades to line or load wires . . . provides greater reliability.



NEW PLUG-IN 5TH OR 6TH TERMINAL, another General Electric exclusive in ringless sockets, installs in seconds—without tools—greatly simplifies shop or field conversion.



'Numbered Doors' Spot Cars Quickly

In order to facilitate the unloading of materials at the storeroom of Georgia Power Co's new service center, storeroom doors along the railroad siding are numbered with large numbers installed at right angles to the outside of building and near the top of the door for easy visibility. When materials are ordered the number of the door at which they are to be unloaded is placed on the order. When they are shipped, this door number is put on the bill of lading. Train crews then spot the cars at the proper doors so that minimum handling is required to unload.

'Bagging' Protects Rubber Gloves

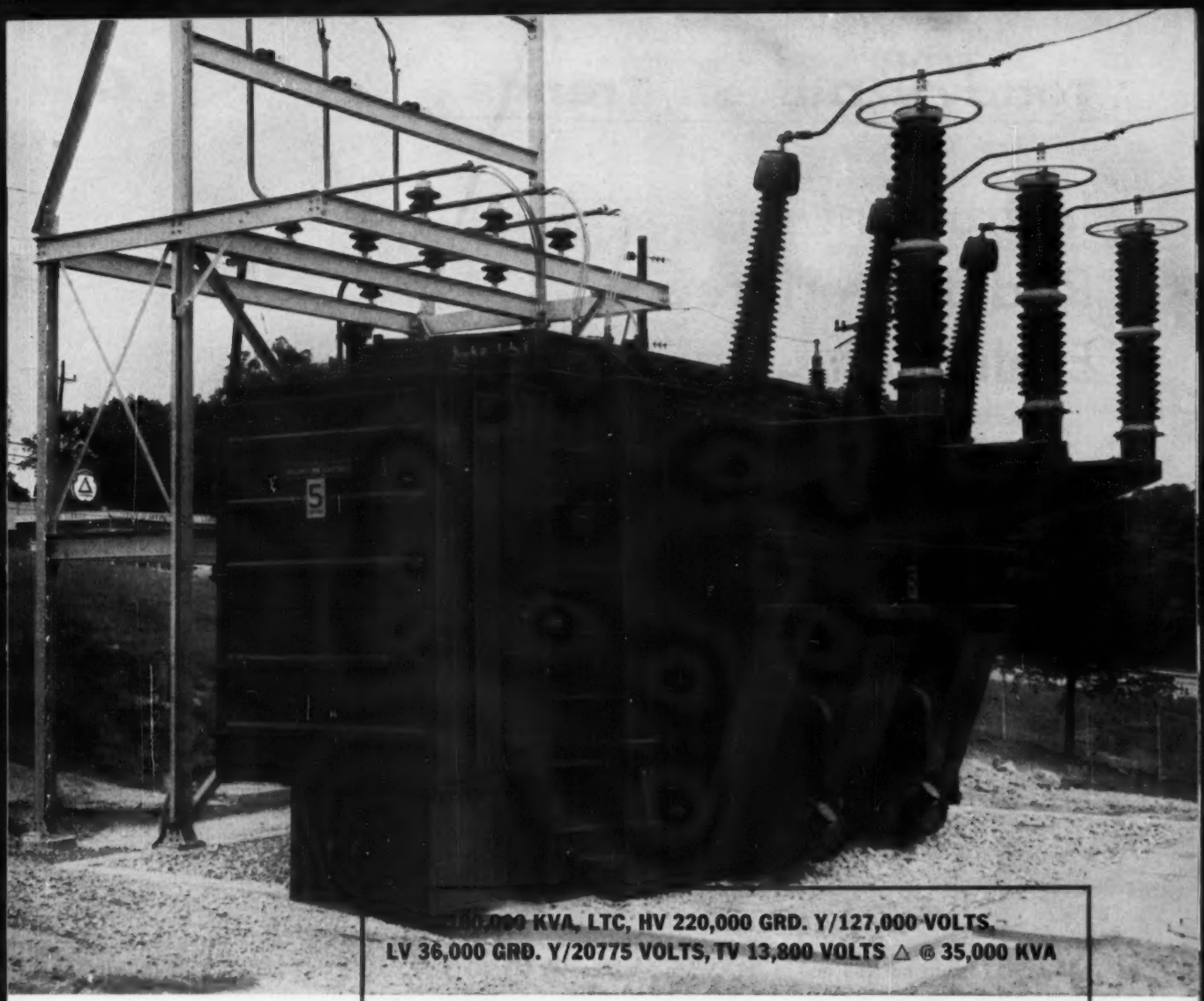
MESH BAG HOLDER can be taken off one tub and placed on another

To prevent damage to rubber gloves after they are safety-tested, Georgia Power Co's test operators transfer the gloves from the test tank to a mesh bag prior to placing them into the drier.

After rubber gloves are safety-tested they must be removed from the test tank and placed in a drier. Often when the gloves are individually placed in the drier they hang up and are damaged from excessive heat. To prevent this occurrence at GPCo, the gloves, after testing, are bagged together prior to placement in the drier. To facilitate the bagging of the gloves, while at the same time insuring that the gloves won't inadvertently be snagged-damaged, a bag-holder is used which fits atop an ordinary wash-tub.

The holder is made of ⅜-in. steel rod. First, rod is shaped into two circles. One circle is formed so as to fit over the rim of a conventional galvanized tub; the other circle is made to fit the mouth of the mesh bag. These two rings are held apart by three straight rods of the same size. All parts are welded together to form the bag holder.

The holder fits over the top of the galvanized tub. Shanks on the straight rods extend down beyond the lower ring to keep the holder in place on the tub. The top of the mesh bag is fastened to the holder's top ring so that the mouth of the bag is held opened. When the bag is full, it is lossened from the holder ring. The bag full of rubber gloves remain in the tub until the bag is to be placed in the drier. The bag holder can readily be shifted from one tub to another.



,000 KVA, LTC, HV 220,000 GRD. Y/127,000 VOLTS,
LV 36,000 GRD. Y/20775 VOLTS, TV 13,800 VOLTS △ @ 35,000 KVA

Power on the Potomac

100 MVA, 220 KV, Moloney LTC Transformer installed at Potomac Electric Power Company's Takoma Substation #27. This unit was placed into service by PEPCO in 1960, ten years after they had installed Moloney's first LTC Transformer, a 3750 KVA unit. The design principles of Moloney LTC are still the same and have been proven by a decade of service. Two of the main principles of Moloney LTC are:

1. All arcing is confined to special arcing contacts on the load transfer switch greatly reducing maintenance of selector switch contacts.

2. The exclusive, patented, reactor by-pass arrangement eliminates reactor loss and reduces voltage drop on non-bridging positions.

For additional information on Moloney LTC equipment request Bulletin LTC 2907. Contact your local Moloney representative on all transformation requirements.

ME61-9

MOLONEY ELECTRIC COMPANY

Manufacturers of Transformers for Utilities, Industry and Electronic Applications

FACTORIES AT ST. LOUIS 20, MISSOURI AND TORONTO, ONTARIO, CANADA

Instrument Aids Radio Interference Evaluation

SHAFT POSITION DIGITIZER is attached to gauge by special coupling to permit removal and attachment without affecting zero setting

Early this year Bonneville Power Administration will set up seven battery-powered digital data collection stations, utilizing devices for optically reading weather instruments. Data stored on paper tape will be used to draw correlations between weather conditions and rf interference emitted by power lines.

Ultimate aim is to develop new approaches to the problem of reducing power-line emitted rf noise output. Such studies as this have been impractical until now, because they require a great amount of data to be read and transcribed at relatively short intervals.

Two basic instruments are at the heart of the "ADVisor system" purchased by BPA. One is a shaft position digitizer which reads the position of the pointer on a dial. The other is a shaft velocity digitizer which translates the rotating action of an instrument into an rpm, mph, or related discrete figure. Both instruments and the system itself were developed by Advanced Instrument Corp, Emeryville, Calif.

The instruments will read gauges denoting wind direction, wind velocity, temperature, barometric pressure, moisture content and rainfall. These factors will later be correlated with rf noise as denoted by the output of a milliammeter, also to be read automatically.

The shaft position digitizer mounts over a standard pointer-type instrument, 3 in. in dia or larger, whose needle has been fitted with a tiny mirror. Four signal wires and a common return connect each digitizer to a central logic unit. On a —12-v dc "interrogate" command, which can be given manually or at automatically timed intervals, a motor-driven arm sweeps the path of the dial pointer. It carries a lamp and photoelectric cell, along with contact wipers that ride on a stationary commutator disc.

When a contact reaches the "zero" reference index point on the disc, it gives the "start counting" signal on the corresponding wire. As the arm continues to rotate, the contact sweeps a series of conducting segments corresponding to dial divisions.

Each segment division completes a circuit which provides an information pulse. When the rotating arm reaches the mirror-carrying dial pointer, reflected light from the lamp activates the photocell, sending a "stop counting" pulse to central logic. Number of information pulses counted at central logic between zero and pointer position gives the discrete reading, which can then be projected on a readout device, recorded on paper tape, or both.

Shaft velocity digitizer works on the same principle, but in this case the photocell remains stationary while a disc holding an appropriate number of equally spaced mirror segments is mounted on the rotating shaft. An information pulse is generated at every pass of a mirror segment which occurs within a precisely timed interval. The number of pulses counted is made to correspond directly with the mph, rpm, or other velocity figure desired by adjusting the length of the time signal and selecting the correct number of mirror segments to mount on the shaft.

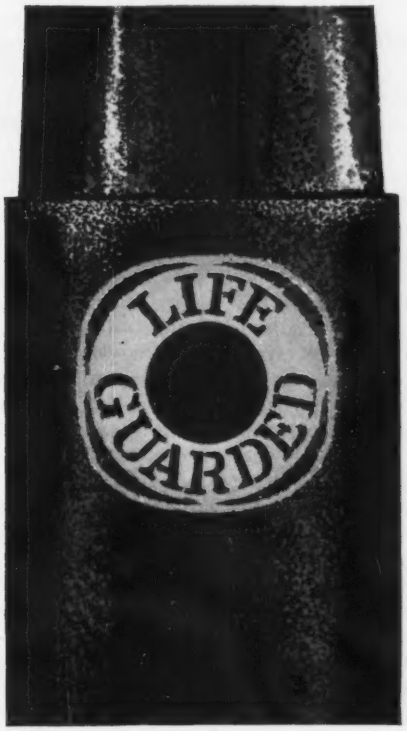
At the center of the system is the logic unit, which sequentially interrogates each conversion unit and receives all pulses.

A total of 23 shaft position digitizers and five shaft velocity digitizers will be installed at the seven collection stations. Each station will have tied to its central logic unit an Advinco Perfograph. This is a small portable tape recorder, which records data by spark-incinerating tiny perforations on ¾-in. wide high-cellulose-content paper tape.

Current plans call for stations to operate unattended, readings on each parameter being taken automatically at 30-min intervals.

Data will be collected at regular intervals and processed at a central "tape department" where an Advinco tape reader will convert weather and rf output on the tapes to conventional punched cards.

BERMICO® electrical conduit surrounds today's vital electrical and communication lines with a sheath of *positive* protection. This advanced, non-rigid conduit has the exceptional strength and durability that permanent installation demands. It has high dielectric strength and resists acids, alkalies, and heat. It's waterproof, corrosion proof, and root proof. *It's practically indestructible!*



ELECTRICAL conduit installation is fast, easy, and economical using lightweight Bermico Conduit. One type in 4″ size weighs only 2 lbs. per foot! Smooth bore assures easy pull-through without damage. Ideal for pneumatic rodding! Quickly cut and tapered on the job, it's self-sealing at the joints. Flexible lengths provide smooth, efficient single or compound bends in the field. *It's serving in installations ranging from airports to urban renewal!*

CONDUIT with super stamina for electrical use is now available in Bermico Conduit. Its tough, chemically inert base of cellulose fibre is precision formed and vacuum-sealed with special formula pitch. The resultant smooth, jet-black conduit is completely uniform from end to end . . . in thickness, bore, and quality . . . completely reliable. Types for direct burial, with or without concrete encasement . . . limited burial types. All necessary fittings to match . . . all made from the same rugged bituminized fibre. Write Dept. EW-3 for booklet, "BERMICO *Life-Guarded* Electrical Conduit."

Bermico Fibre Conduit distributed nationally through Westinghouse Electric Supply Company

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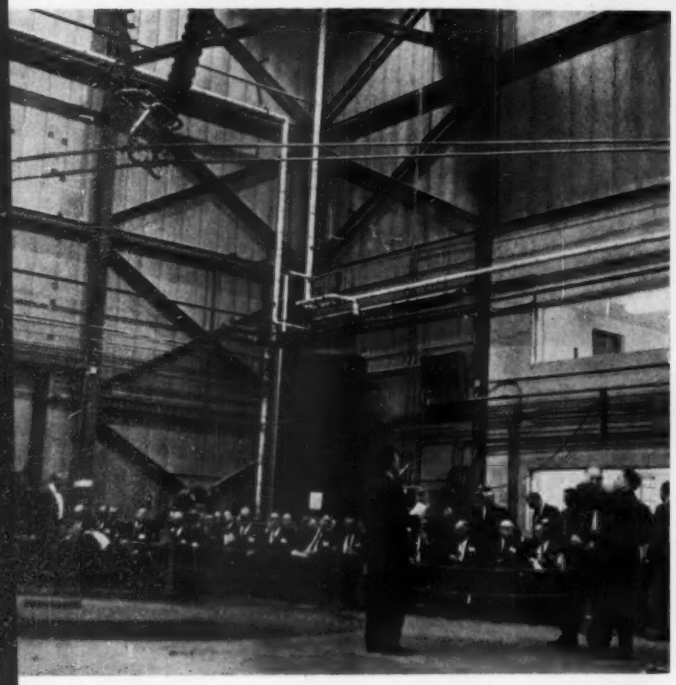
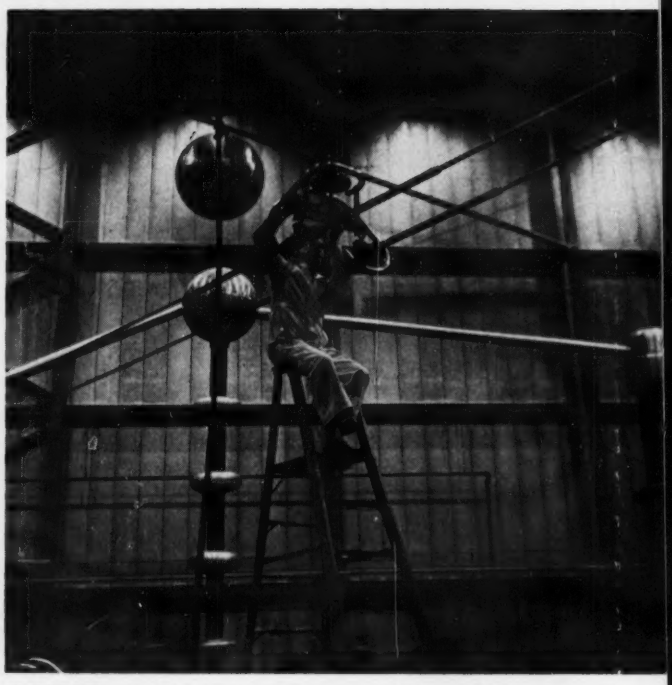


FIRST TEST is on V-suspension with bundled Drake cable in preformed armor rods, forged clamps, and Lapp shields



CLOSE-UP of single suspension string and bundled Drake cable in armor grip suspension clamps with Lapp shields

Lapp Tests Grading Devices for EHV Line

Engineers from 20 utilities witness two-day series of tests of transmission equipment for 345-kv Niagara Mohawk line

A two-day program of corona-RIV tests on 345-kv transmission line equipment developed for use on the Niagara Mohawk Power Corp system in New York State was conducted Feb. 28 and March 1 at the high voltage laboratory of the Lapp Insulator Co at Le Roy, N.Y.

The tests were witnessed by a group of 43 ranking transmission engineers representing 20 utility and consulting firms in the United States and Canada. The program embraced a series of 23 separate tests intended to demonstrate new developments in shielding for 345 kv developed by Lapp in cooperation with Commonwealth Associates, consultants in the design of the Niagara Mohawk line. Unlike conventional side-mounted corona rings, the Lapp grading device relies on compound curvature to put the tubing in strategic stress locations without excessive welding.

During the two days tests were made on bundle conductor dead-end, angle, V-type and conventional suspension assemblies using conventional forged clamps, preformed armor rods and yoke plates. The purpose was to demonstrate effectiveness of the new grading devices in eliminating corona around hardware and in grading insulator strings with a minimum of tubing and welding.

Included was a series of tests using armor-grip suspension devices to show the small amount of grading necessary. Other tests were run on strut-type insulators, Station-Post bus support assemblies, bundle-conductor spacers and single-conductor suspensions.

A secondary purpose of the test program was to verify earlier prototype tests on the new Lapp grading devices, using production assemblies in combination with the insulators, clamps, armor-rods and fittings to be used on the Niagara Mohawk line, which is now in the early stages of construction.

Highlights of the transmission line route and of the design of the two single-circuit 345-kv steel tower lines being built by Niagara Mohawk were described by William Widdowfield of the utility's Eastern Division in Albany. The two narrow-base (Ohio Edison type) tower lines will carry power produced at Niagara and the St. Lawrence Project near Messena, N. Y., east from Utica to Albany and south to the Consolidated Edison system at Poughkeepsie, a distance of 200 miles. Immediately south of Albany the lines run along the west side of the Hudson River then cross to the east shore over a 2,000-ft span and continue south. The lines are being built, Widdowfield explained, to take advantage of the seasonal peak load diversity between the Niagara Mohawk and Con Edison system and to permit

(*Continued on page* 66)

The nearsighted MISTER MAGOO says . . . "1956? A banner year! Princess Grace was married—unfortunately I couldn't attend—and General Electric invented the Power Groove Lamp. Happy birthday, Power Groo—Bowser! drop that salami! You've taken enough bites out of it already!"

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G-EXCLUSIVE! Power Groove® cuts your customers' initial costs as much as 40¢ a sq. ft.

General Electric Power Groove Lamps start saving your customers' money the day they're specified.

By any standard of comparison, they give more light—with fewer lamps—than any other fluorescent type or brand. If your customers are building or remodeling, Power Groove Lamps *can save them up to 40¢ per square foot of lighted floor area* right off the bat.

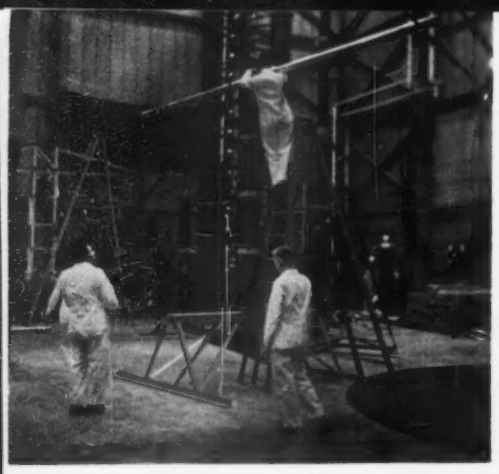
Just the beginning. With fewer lamps, fixtures and ballasts overhead, maintenance men spend less time on ladders.

Employees' increased efficiency helps pay for Power Groove Lamps. If every reject makes a customer wince, show him how improved lighting—at no extra cost—might spruce up his operation. Perhaps he can remove the individual lamps that light only machines or tables.

General Electric's 5-year-old secret is in the grooves. They bend a 9-ft. arc stream through an 8-ft. tube and swing it closer to the light-producing phosphor coating. No other fluorescent lamp compares with the Power Groove. Call your General Electric Lamp distributor for more details. General Electric Co., Large Lamp Dept. C-14, Nela Park, Cleveland 12, O.

Progress Is Our Most Important Product

GENERAL ELECTRIC



STATION POST and bus clamp with 4-in. IPS aluminum conductor is readied for test by technicians. The extra high strength Station Post had 1470 BIL

installation of larger units in the future. Completion of the lines is scheduled by the spring of 1962.

The 60-mile portion of the line in Con Edison's system from Poughkeepsie to Dunwoodie substation in Yonkers will be carried largely on a double circuit tower line, as described by E. G. Watkins.

GE Develops Static Inverter

A new highly regulated, static inverter power supply which produces a continuous alternating-current output has been developed by General Electric Co's low-voltage switchgear department, Philadelphia, Pa.

Applicable to utility systems where continuous emergency standby ac power is needed, the new static inverter converts dc power from a 129-v battery source to 115-v, single-phase, 60-cycle ac.

For completely static operation, the new unit incorporates a GE silicon controlled rectifier as the principal power regulating device and features convection-cooling for lower preventive maintenance.

Three 2.5-kw static inverters have been manufactured and shipped for use in microwave equipment. The units, rated 2 kva at unity power factor and 3.5 kva at .7 power factor lagging, has an ac output of 115 v regulated ± 5%.

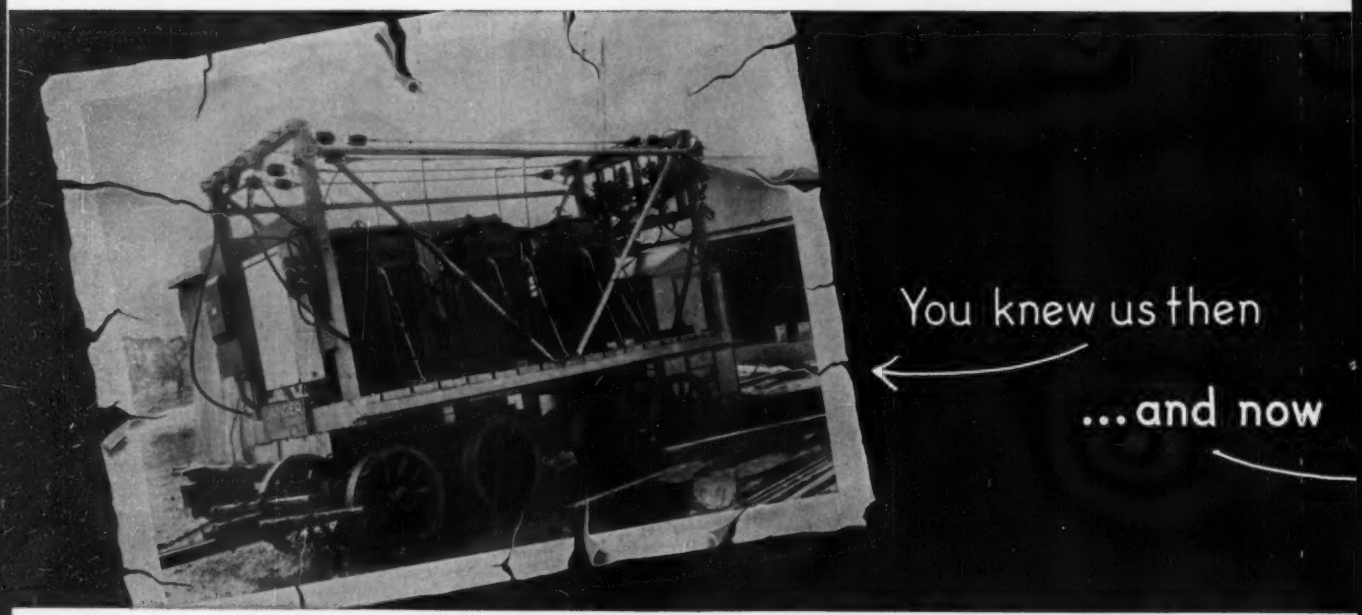
Featuring continuous operation because of a floating battery, the new static unit operates at an efficiency up to 80%, over a range of from + 10% to 18% v dc.

During normal operation, ac input power is converted by a battery charger to direct current which supplies the inverter. A battery (60 lead-acid or 92 nickel-cadmium cells) is floated on the input to the inverter.

When ac power fails, the battery supplies the inverter with no interruption occurring in the ac output of the inverter.

Maintenance is reduced and lubrication is eliminated since the unit is completely static and has no moving parts.

The static inverter power supply consists of a disconnect switch, fuses, breaker, GE voltmeter and ammeter, load selector switch, pilot lights, etc., and is shipped complete from the factory.



Allis-Chalmers sets the pace for mobile substation progress

Remember this 12,000-volt "powerwagon"? Of 1930 vintage, it contrasts sharply with its modern-day counterpart — the compact, 20,000-kva mobile substation on the right.

Since these early pioneering efforts, A-C research, development and manufacturing have proved their maturity . . . *Contributing:* • Better insulations for switchgear to handle larger blocks of power in smaller cubicles • Distribution regulators offering greatly increased short-circuit protection • A-C nuclear power plant development to hasten the day when power from the atom is proven to be economically practical in more areas of the world • New A-C fuel cells that may soon offer a new source of electric energy • A-C

Power Supply

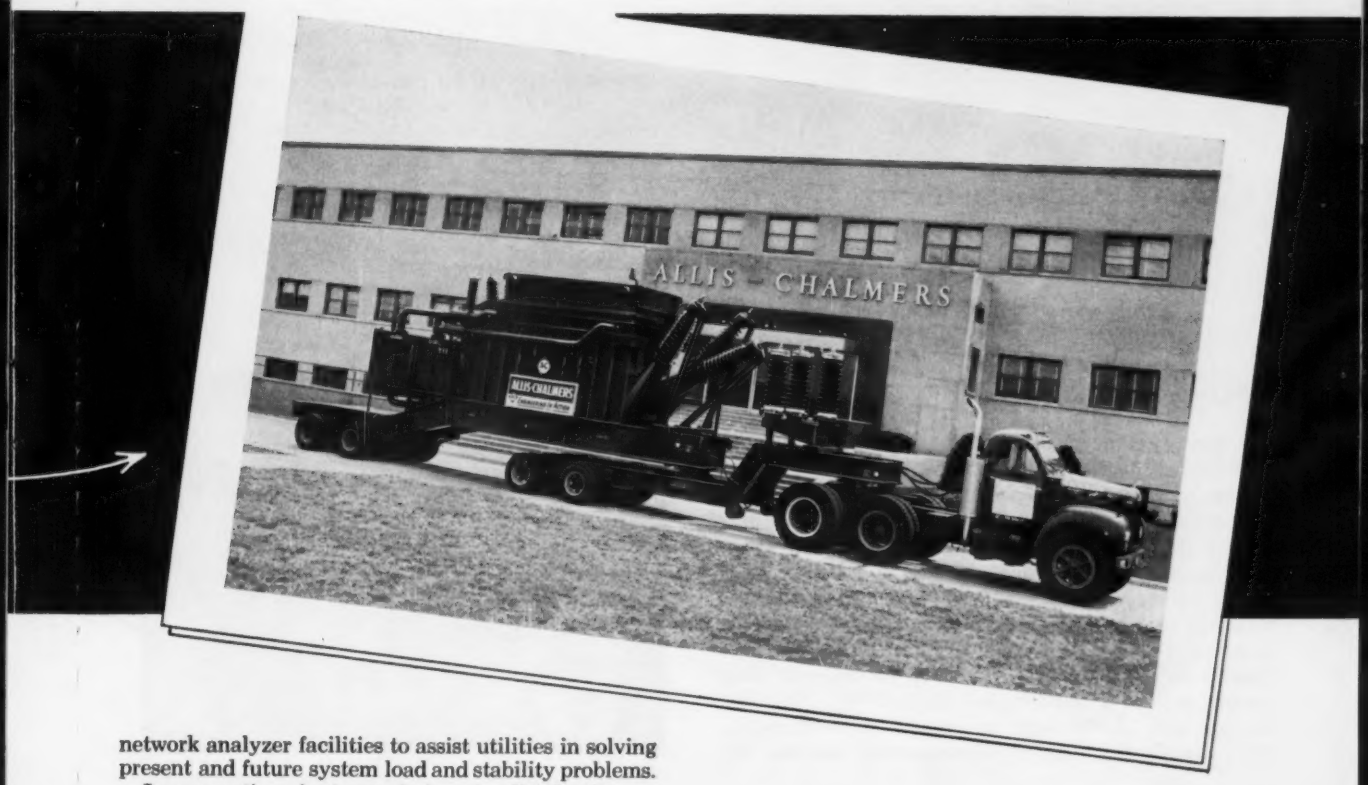
STATIC INVERTER, rated 2 kva at unity power factor, 3.5 kva at 0.7 power-factor lagging, has a 115-v ac output, regulated within plus or minus 5%

MANUFACTURERS BRIEFS

• **J. A. Weaver Co,** manufacturer of electrical fittings, has more than doubled its production capacity by adding a non-ferrous foundry adjacent to the St. Louis plant. The foundry, which recently started production, is said to be the most fully automated facility of its kind in the midwest. Along with modern production equipment, the new building houses a complete laboratory for testing castings and for control of foundry sand. Weaver is also remodeling and adding to its present plant area and equipment.

• **General Electric Co** has established a new product section, the nuclear electronics products section, as part of GE's atomic power equipment department. It is headed by J. R. Wolcott, APED's manager—manufacturing, and about 100 persons are being transferred from other APED sections. Operation of the section will cover the development, design, manufacture and marketing of electronic systems and components for control of nuclear reactors and other specialized instrumentation used in the nuclear field. In conjunction with APED's activities, GE has announced completion and shipment of the nuclear control instrumentation for two US Atomic Energy Commission development nuclear power plants: the 75-Mw Hallam Nuclear Power Station, and the 12.5-Mw City of Piqua Nuclear Power Station. Also, the department recently reported the shipment of nuclear control instrumentation for Con Edison's 275-Mw Indian Point Nuclear Power Station.

• **Rome Cable Div** of Aluminum Co of America has moved its northern California distribution center from San Francisco to Utah Construction Co's Industrial Park in south San Francisco. The new, 25,000-sq-ft facility will double the former warehouse capacity.



network analyzer facilities to assist utilities in solving present and future system load and stability problems.

In generation, in transmission, in distribution — Allis-Chalmers has helped America's growing utility systems set the pace in low-cost electric power. *For more information, write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin.* A-1431

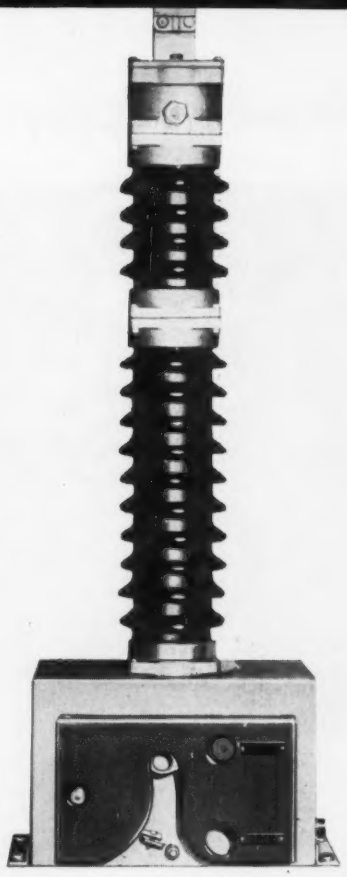
ALLIS-CHALMERS

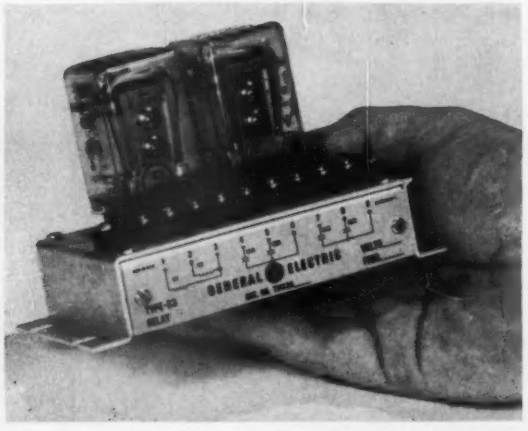
New Equipment

Grounding Switches . . .

. . . achieve fast grounding of power system lines economically and reliably. Type PGH high-speed grounding switches are 23-34.5 kv and 46-69 kv, with both units rated at 20,000-amp momentary closing current. Each switch is actuated by a relay which senses a low-magnitude fault, such as an internal fault in a transformer. Six-cycle closing of the switch quickly establishes a high-magnitude fault which can be sensed by the relay of a backup circuit breaker—allowing economic extension of the effective range of the breaker. Closing time of six cycles includes trip coil operation. Each switch consists of an oil-filled porcelain housing, internal contacts, and enclosed mechanism, and meets all NEMA and AIEE standards for high-speed grounding devices. Units can be mounted on a substation structure or separate pedestal.

Line Material Industries, McGraw-Edison Co, Milwaukee 1, Wis.





Auxiliary Relay . . .

. . . provides isolation for multi-circuit demand meters. The S-3 relay may be used to isolate billing and controlling demand meters, or where more than one meter is connected to a D-30 contact device—as in load survey applications, demand limiting, or load monitoring. Although it was designed primarily for back-of-board mounting, it is also suitable for cabinet or trough applications.

General Electric Co, Schenectady 5, N. Y.

Pad-Mounted Gear . . .

. . . for switching, protecting and isolating residential underground distribution circuits, 2.4 to 14.4 kv. Gear consists of fuses and disconnects expressly designed for compact, air-filled enclosures. Basic applications are for transformers and for sectionalizing. In either case, fuses and disconnects operate in air with completely visible circuitry and can interrupt load, magnetizing, or charging currents when operated with Loadbuster—S&C's portable load-break tool. With Loadbuster, the gear will switch up to 400-amp load current at 14.4 kv. Fuses are up to 200E amp continuous and 17,500 amp asymmetrical, interrupting.

S&C Electric Co, 4435 N Ravenswood, Chicago, Ill.

(*More New Equipment on page* 70)

Pre-Engineering by **KAISER ENGINEERS** answers basic plant expansion questions...

Raw Materials?

Your final decision to expand or build results from a series of important individual decisions. Raw material availability is one of them. Independent analysis of all aspects of your proposed program is the *Pre-Engineering* service offered by Kaiser Engineers. In addition, KE designs and builds all types of power plants—steam-electric, gas turbine, combined cycle, nuclear and hydro-electric. Whatever your requirements . . . from Pre-Engineering analyses through plant design and construction . . . Kaiser Engineers brings world-wide experience and ingenuity to their solution.

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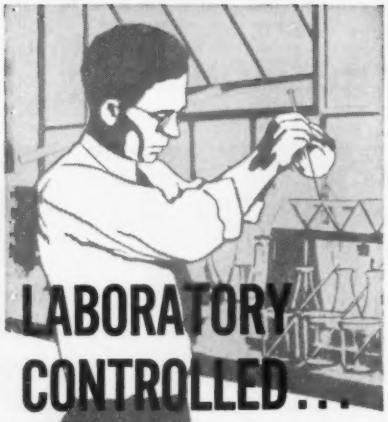


LABORATORY CONTROLLED...

Crapo

GALVANIZED STEEL STRAND FOR GUY, MESSENGER and OVERHEAD GROUND WIRE

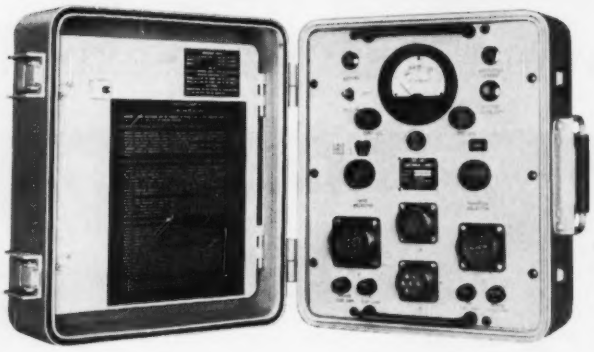
The high, uniform, consistently-dependable quality of Crapo Galvanized Steel Strand is the direct result of close laboratory control over each step in manufacture. All wires used in forming a particular size and grade are produced from steel of selected analysis, carefully processed under technical supervision and stranded on precision machines. Both wire and finished strand are subjected to prescribed laboratory tests to insure the desired end result.

Heavy, uniform, tightly-bonded zinc coatings, applied by the famous Crapo Galvanizing Process, provide maximum resistance to corrosion.

Write for booklet OG-25 containing "Sag and Tension Data for Overhead Ground Wire."

INDIANA

STEEL & WIRE CO., INC., Muncie, Indiana

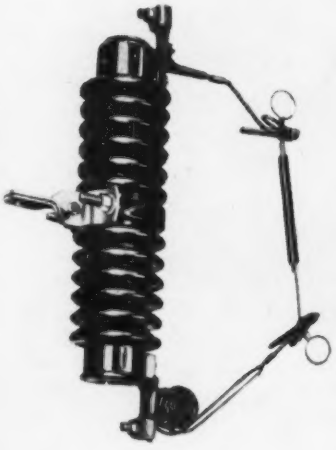


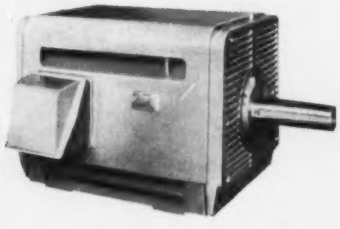
Cable Tester . . .

. . . is designed for one-man field operation. The portable electrical cable test set has "go/no go" meter. Interconnecting cables are checked for crossed wires, short circuits or open circuits. Power cables can be checked for proper ac and dc voltages and correct phase rotation. Up to 35 conductors in one cable can be handled by the standard model and a greater number on special order. The test set operates from 115-v, 60 to 400-cycle source, or from two self-contained 2.7-v mercury batteries. Unit weighs 21 lb, measures 7½x13¾x11½ in.
Hallicrafters Co, 4401 W Fifth Ave, Chicago 24, Ill.

Flip-out Cutouts . . .

. . . dependably protect lines with low available short circuit currents. Units, catalog Nos. 2598 and 2599, 7.8 and 15 kv, respectively, are part of the Faultmaster line. Despite being simple in design and rugged for trouble-free duty, these cutouts have sure-grip contact arms which prevent fuse link ends from falling to the ground after interruption. This feature minimizes fire hazard and assures easy indentification of the fuse link. Double-forked contact arms afford simple fusing from either side. The cutouts are also bird-proofed.
Hubbard & Co, 200 S Michigan Ave, Chicago 4, Ill.





Ac Motors . . .

. . . have decreased size and better cooling because of use of nearly round stators inside nearly square frames. Duty Master D-5000 units are available from 125 through 300 hp. Air, drawn into louvered openings, is ducted

(*Continued on page* 72)

G&W Type N Network Switches Have That Extra Reliablility For A Demanding Service

TOP SERVICE is expected of a secondary network. Anything less than the best makes the headlines. But Top Service must be built into every single part of the system — including switches — if Top Network Reliability is to be realized.

G&W makes no network cables or transformers. But it does make network switches; we think the best in the business. Here are some of the reasons why.

G&W Standardized Type N Network Switches meet and exceed all EEI NEMA Standards:

1. Rated 15 kv, 95-kv Basic Impulse Level, 200-ampere continuous current carrying capacity, 5-second short-circuit rating of 15,000 amps in the grounded position.
2. Rated no voltage break or transformer exciting-current break, including appropriate electrical interlocking arrangement.

The Type N Network Switch incorporates components of proven reliability, demonstrated by years of field operation:

1. Patented rocker-arm switch construction, which includes Permali® stringer for holding the three-phase contacts (a specially designed laminate known for its excellent mechanical and electrical characteristics.)
2. "Z"-slot operating handle, which prevents overriding of the electrical interlocks by mechanically blocking direct operation from "off" to ground.
3. Encapsulated interlock coils, for use with either oil or askarel.
4. Magnetic oil-level indicator with retained gasket reduces the possibility of liquid leakage.

These are some of the significant reasons why any network-switch application is more reliable when G&W Type N Network Switches are specified as part of their construction. A complimentary copy of G&W Engineering data sheet No. 614.101 available upon request.

G&W ELECTRIC SPECIALTY COMPANY
3500 WEST 127th STREET • BLUE ISLAND, ILLINOIS
CANADIAN MFR. • POWERLITE DEVICES LTD. • TORONTO, MONTREAL & VANCOUVER

superior quality standards—inspired specialized design

D61-3

BUY MEN?

OR RENT 'EM?

Keeping line crews on your payroll to perform all electrical maintenance and distribution work is needlessly expensive. The efficient alternative is to use qualified electrical contractors as a ready service team.

You get the skills and equipment you need *when* you need them.

You know exactly what every job costs.

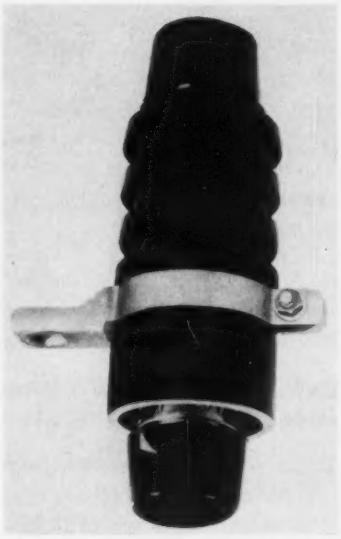
You reduce equipment overhead.

You avoid personnel headaches, get a firm job completion date, and written performance guarantee.

Why buy men? Rent the services of a qualified contractor. Write us today for the name and address of the *qualified* NECA contractor nearest you. National Electrical Contractors Association, 610 Ring Building, Washington 6, D. C.

NECA

through the rotor and stator and then exhausted at the sides—to provide more efficient cooling and more horsepower. Class B insulation is standard. Louvers can be removed for inspection and maintenance. Drip-proof enclosures are standard, but splash-proof enclosures can be specified. Encapsulated stators can be ordered for severe conditions. Motors are offered with either sleeve or ball bearings in 220, 440, or 550-v units for 3,600, 1,800, 1,200, and 990 rpm.
Reliance Electric & Engineering Co, Cleveland 17, Ohio



Lv Distribution Arrester...

. . . reduces impulse sparkover 20%, as well as discharge voltage characteristics. Size and weight are also reduced 20%. A unique nonexplosive dropout prevents line lockout in the event of a damaged arrester. Power follow current not "valved off" in ½ cycle after discharge of a lightning stroke actuates a thermal element in the dropout device to separate the ground stud from the arrester body. Gases inside the arrester escape during the dropout operation, preventing personnel handling hazards. Effective creep distance from line to ground has been increased by 20%. The "undercut" skirt design is said to be a first in distribution arrester design.
Westinghouse Electric Corp, Box 2099, Pittsburgh 30, Pa.

the Eyes of Science are on

GEORGIA's RESOURCES *in* RESEARCH

Aeronautical Engineering / Chemical Engineering / Civil Engineering / Electrical Engineering / Industrial Engineering / Mechanical Engineering / Minerals Engineering / Textile Engineering / Ceramics / Chemistry / Mathematics / Physics / Electronics / Industrial Development / Systems Analysis / City Planning / Health Sciences / Nuclear Sciences Digital and Analog Computational Services / Technical Information Services

MAIN BUILDING — Engineering Experiment Station, Georgia Tech, Atlanta, Georgia

Georgia is opening the eyes of the world to new wonders in Science and Engineering. As a result of Georgia's record appropriations for education and research, young eyes will look deeper into the technological world of the future . . . and skilled scientists and engineers will discover and apply broad, new horizons for the betterment of man and industry.

For over 70 years, the Georgia Institute of Technology has been the recognized model in technological education in the South. Its engineering, science, architecture, and management graduates now make up the bulk of Georgia's technological manpower. This talent pool is sufficiently great to afford valuable manpower to areas outside the State.

During the past two decades, Georgia Tech through its Engineering Experiment Station and departmental research programs has established itself as the largest, most versatile engineering and industrial research agency in the area. From its research programs have come new products, new industries, a better understanding of the world in which we live, and a higher per capita income for the people of the State and the region.

Georgia Tech's educational and research progress is another indication of Georgia's future planning to provide scientifically equipped manpower and industrial research and product development for world benefit.

S. ERNEST VANDIVER, *Governor*

GEORGIA DEPARTMENT OF COMMERCE

Jack Minter, *Director*
Georgia Dept. of Commerce
State Capitol Atlanta, Georgia

Please send me details on ☐ Research and Business Opportunities in Georgia ☐ Resources for Research — Georgia Tech

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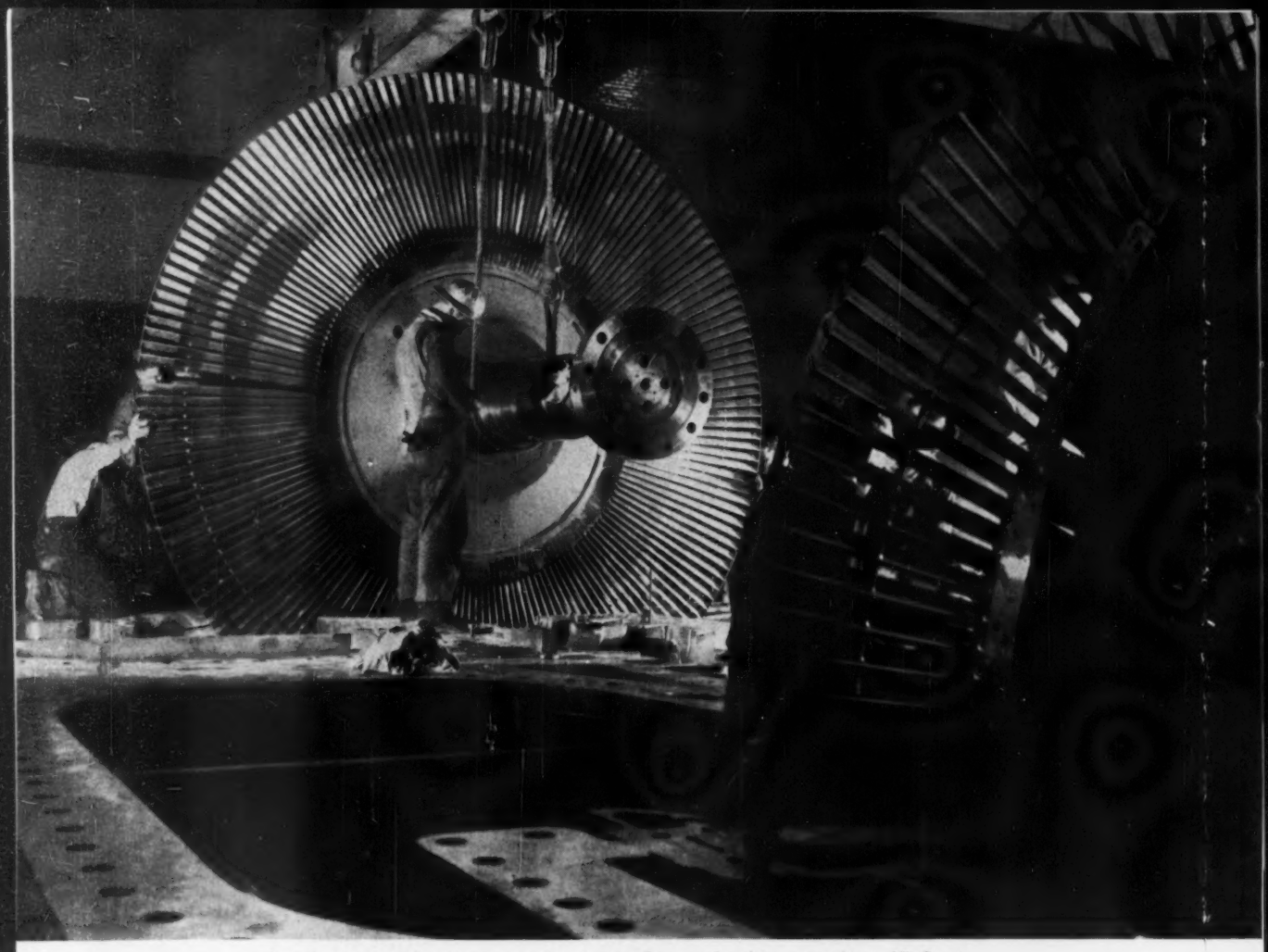


Prompt, personalized service at your plant, in one of our service shops, or at the world's finest turbine-generator manufacturing facility . . . is part of your General Electric turbine-generator.

Priority repair for your General Electric turbine-generator starts with its pedigree

When General Electric ships your turbine-generator, part of it stays behind.

We keep its pedigree—a permanent record of engineering and manufacturing specifications, inspection reports, and other pertinent data. And we keep it up-to-date.

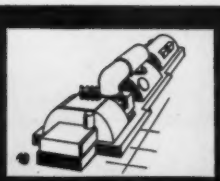
Then, whenever repairs are needed, our experienced turbine-generator service teams refer to the pedigree, promptly analyze the trouble, and set up a program of priority repair. Your unit is given top priority handling on a personal basis—utilizing the extensive technical know-how, materials, resources, and manufacturing facilities available at General Electric.

Thus, your turbine-generator's pedigree is an integral part of General Electric's priority service program—a program designed to put your turbine-generator back on the line in the shortest time possible. 244-07

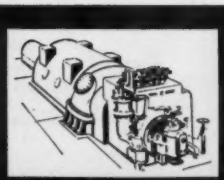
Progress Is Our Most Important Product

GENERAL ELECTRIC

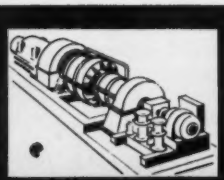
General Electric Turbine-Generators Help Keep Power Costs Low



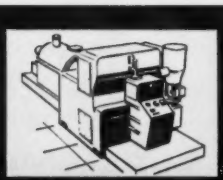
Steam turbine-generators for large blocks of power



Steam turbine-generators 100,000 kw and lower



Gas turbines for peaking, base load, combined cycles



Mechanical drive steam turbines for auxiliaries

Electrical World

MARCH 13, 1961

Management Newsletter

- **Increased Government Surveillance . . .**
- **Manufacturers' Overcapacity . . .**
- **Low Prices . . .**
- **Research and Development in Jeopardy in . . .**

The New Era of Competition

In Detroit last month, utility buyers gathered to discuss the present chaotic market situation. Warren W. Shew, publisher of Electrical World, *was asked to present his thoughts on "buyers' responsibilities in developing sound, ethical procurement standards that might assist in solving the manufacturers' problems." Management Newsletter devotes this edition to a summary of Shew's comments.*

All of us work for a single customer—and that customer is the fellow who switches on the light in his home and makes the watthour meter go 'round. In the end we are accountable to him. Up until now he has not been greatly interested in our intramural wrangling, but he may become more interested in the months ahead. And unless we can summon the wisdom to work out our own problems, the political representatives of that ultimate customer may very well decide to step in and take the problems and our business right out of our hands.

With this possibility firmly in mind, I think it is of interest to go back to the beginning of the electrical business and refresh our memories on just how this great industry came into being. During the 1880's and 1890's, the pioneer sales agent of electric light was a resourceful, versatile Jack-of-all-trades; he was a missionary and a promoter. He went into communities where electric light was known only by hearsay and won over men of means; interested them in financing an electric light company; helped them find property sites; persuaded the town government to grant an operating franchise; assisted in the organization of the company; sold it the necessary equipment; and considered his task completed only after construction and actual operation.

We might also be reminded of the several securities organizations that were set up to finance utilities during the periods when the market was not ready to supply capital demands. Also later when smaller communities were finding it difficult to get adequate capital, a financing method was worked out by manufacturers. Of course, they wanted to sell the equipment that would be needed, but my pur-

pose in mentioning this is to remind us that a partnership has existed from the beginning.

But today, the partnership is out of balance. One of the partners, the utilities, is in the driver's seat. This has not occurred by design. It is the simple result of an obvious economic fact—overcapacity in electrical equipment manufacturing.

Buyers' markets thrive on overcapacity, and overcapacity is the dominant characteristic of the equipment industry today. There is sufficient capacity to meet the needs of the utilities for at least the next five years. In many product lines only two or three manufacturers could easily supply all the utilities' needs by means of a second shift and a little sub-contracting. Steam turbine generator manufacturers, for example, are ready today to ship approximately 17 million kw per year. This compares with about 9.4 million kw shipped in 1960, and predictions of 10.2 million kw for 1961. The utilities will have no need for the manufacturers' full capacity in thermal units until sometime between 1965 and 1970 when their additions to capability will cross the 17-million-kw mark. In large power transformers, manufacturers are said to have a capacity of about 80 million kva a year. But last year, shipments totaled only about 46 million kva.

Overcapacity runs into distribution equipment as well. About half the companies manufacturing meters with just a little extra effort would be able to supply all the utility industry's requirements for some time to come. Distribution transformers could be supplied in abundance by only five or six of the present manufacturers. In fact, probably two of them could do the job if automation were used to its fullest.

Manufacturers' capacity is constantly growing despite the fact that it is well in excess of demand. This is not the result of poor planning, but simply a by-product of new manufacturing technology. To give some concrete examples: A certain switchgear plant has been working constantly on improving efficiency and developing better cost control methods. After many years, it has cut plant space by 5%. But at the same time, productive capacity has risen some 25%. Another facility in a multi-story plant will consolidate manufacturing in a one-floor building with new tools accounting for 50% of the capital expenditure. Floor space is cut 10%, but productive capability is up 30%. In a rotating equipment plant, an increase of 25 to 30% in production is being achieved with virtually no increase in floor space because a machine of double the rating can be produced due to both improved design and facilities.

There's another check against rising prices. This is the very diligent and persistent approaches being made by foreign suppliers. Past experience with foreign equipment indicates that in general this equipment presents system design and operating problems that are just not worthwhile at present prices. This may be a reason why it is only a minute factor in the utility market at this time, and why several utilities have adopted a "buy American" policy. But as long as foreign suppliers stay seriously in this market, they are a real safety valve against runaway domestic prices.

There is no need to dwell on any other examples to prove to you that there is ample capacity to meet all your product needs for up to ten years ahead. This, along with foreign suppliers, will keep prices in line. Even the increase of normal inflation can be met with product development through innovation so that prices for some products will not increase at all and, yes, even decrease in some instances.

The present market situation has the manufacturers in trouble. Department of Commerce figures tell part of the story. For all electrical machinery manufacturers, profits on sales after taxes in the third quarter of last year ran a bare 3.5%. Net profits for that quarter were 17% below the same quarter a year earlier. That's the average for all electrical machinery sold to industrials as well as to

Shew urged buyers to heed these Detroit Edison purchasing dept rules:

- Deal fairly. Avoid favoritism and make each transaction both a good buy for the company and a satisfactory deal for the seller.
- Do not bargain with suppliers. Get each bidder's best price on his first quotation. Don't ask a vendor to meet a competitive bid.
- Keep prices confidential. Don't tell a vendor what prices are being quoted by his competitors.
- Establish good personal relationships with salesmen. This is best accomplished when incidental social expenses are shared equally by buyer and seller.
- Know each product you buy. Increase your knowledge of materials and manufacturing processes.
- Cooperate freely with other departments. Be receptive to counsel from them.
- Promote good will. Make purchasing a real service function in all your dealings.

utilities. For the smaller manufacturers, the situation was worse. In many cases there was little profit, and in a few cases, there was no profit at all.

Many manufacturers find the present situation so profitless as to be ridiculous. Some divisions will show profits of about 1% before taxes. One will lose $100,000 on more business than it did in 1958. A large company has a department that will earn $300,000 on about $30 million in sales. Another department of one of the bigger companies has already told its union people that it has lost money every month for the past six months. In one month the loss came to $700,000.

A careful analysis will reveal that utilities are deeply involved in manufacturers' welfare. For every product mentioned, utilities represent almost the entire market. The percentage of meters, transformers, power circuit breakers, cutouts and switchgear that is not bought by utilities is frequently but a fraction of one percent of the total output. Regardless of the price you will not buy one more device than your engineering and operating requirements call for. This means that utilities control the destinies of most manufacturers. Buyers must realize this, be familiar with the makeup of the entire group of suppliers for a given product line, and set policies for the health of that segment of the industry.

Some good can come from this present situation of competition among suppliers. Perhaps we will get rid of some apparent fat and unnecessary frills. This will make manufacturers more efficient. But the situation is also dangerous for the utilities. Two reasons come to mind immediately.

First—The suppliers you are dealing with are becoming more diversified. Utility buyers are competing for attention with the moneyed buyers from the Department of Defense, the well-heeled consumers, and others. As manufacturers find these competing buyers more appreciative and more profitable to deal with, they will be forced to turn more attention to them. This is not scare talk. But I do believe it is a fact. And I do believe than even the smaller manufacturers will be forced to diversity as a hedge against our chaotic utility market.

Second—Research and development is being placed in jeopardy. As a very rough guess, I would say that an average of around $100 million a year is being spent by manufacturers on R&D for utility equipment. A sizable share of this goes into improvement of old products, and development of new ones. There will be a cutback in these expenditures in times of severe profit decline.

One more factor. You can rest assured that you are going to get equipment that will not meet the overload ratings of the past. We all know that the performance of American electrical equipment has no relationship to the nameplate. In the very near future it will; and I believe you have noticed some of this already.

I have made several specific suggestions to both manufacturers and utility buyers which I believe will aid in removing pricing chaos in our industry. But there is one more item which I wish to mention.

Everyone in the market place apparently needs to have a better understanding of how the Robinson-Patman Act applies. Electrical manufacturers and electric utilities together should observe the spirit of the laws prohibiting discriminatory pricing. Then purchasing practices where price and price alone dominates the selling and buying decisions would disappear. A return to full appreciation of value and service is necessary. The Robinson-Patman Act represents amendments to the Clayton and Sherman Acts, and it is believed Congress intended to protect free markets against excessively destructive competition by outlawing discriminatory price cutting.

Of particular interest is the final subsection. It provides that it shall be unlawful for any person to induce or receive a discrimination in price prohibited in Section 2 of the Clayton Act. By terms of Section 4 of the Clayton Act, any person injured as a result of a violation of this act may take action. Thus a manufacturer of electrical equipment could institute such an action against a competitor or a purchaser, such as an electric utility company, alleging the unlawful granting, receipt, or inducement of a discriminatory price.

Shew gave this advice to suppliers:

- Don't take advantage of location to push for reciprocal buying. There is no surer way of losing the respect of your customers.
- Don't discriminate in pricing your products to utility customers. You only stand to embarrass your best friends—the purchasing people.
- Set prices and hold them until the market gets a chance to know about them.
- Speak more frankly of your pricing policies to your customers.
- Get over the idea that there will ever again be a sellers' market.
- Explore new ways of serving your customers.
- Offer the utility buyers some incentive for smoothing out cyclical and seasonal buying.
- Allocate a fair share of R&D costs to the basic cost of a product.
- Sell the quality in your product. Don't trim the quality just to meet somebody else's price.

WIDMAN: Cooperation

SHANNAHAN: Promotion

DAMON: Progress

Coal, Building Trades Get Electric Heating Story

The electric heating industry—and all those connected with and concerned about it—can now count on some additional support.

For enthusiasm displayed at a recent conference was an indication that electric heat is one of the white hopes of the future for the coal industry and building trades.

These groups are now solidly behind the field.

At least that was evident from the tone of the National Coal Policy Conference's Electric Home Heating Conference held in Washington Feb. 17.

Other succinct points brought out: Sell the builder on what electric heating in a home can mean for him in terms of increased sales; and electric heating, as part of the Medallion Home, is one good way to bring the housing market out of its present doldrums.

The coal industry is constantly trying to find new markets for its product, and now it looks as if electric heating is the market they have been searching for, was the way Joseph E. Moody, president of the NCPC looked at the subject.

Quoting American Electric Power Co's President Philip Sporn's prediction for 18 million electrically heated homes within the next 20 years, Moody said that this presents a market for 216 million tons of coal if the electric utilities are then using coal for only 60% of their energy fuel. "And we expect they will be using a far higher percentage than that," he said.

Coal now supplies the fuel for 66% of the electric energy produced by steam electric utilities, and 83% of the total energy produced in the coal producing states. "Those percentages probably will go higher as the cost of other fuels continue to rise and coal-burning boilers continue to gain in efficiency," according to Moody.

Because of this, "coal and allied industries are optimistic about the future of electric home heating," he noted.

American Electric Power Co is aiming at the conversion market as the only way to reach its goal of 500,000 electrically heated homes in 1975, according to John H. K. Shannahan, assistant commercial vice president.

"In the next 15 years, at the present rate of building, we will have built in our territory something less than 300,000 new homes. Even if we sold all of them, we would still be 200,000 short. Therefore the older home is necessary to us," he said.

Though conversion installations showed a 60% increase last year over 1959, conversion sales are tougher, Shannahan said. "It is relatively easy to locate a new house going up—but how do you select the customer or customers out of our 1¼ million who is a prospect for a new heating system?"

Use the satisfied user with "open houses," he advised. Fewer people turn out for these showings, but it is well worth it because those who come are good prospects.

"We all have a stake in electric home heating," Michael F. Widman Jr, assistant to the president, and director of research and marketing, United Mine Workers of America, said. "The miners are concerned because it is their job to mine the coal. The operators produce coal to sell to utilities. The utility profits from the sale of electricity.

"But the customer must also benefit from electric home heating because he is the one who pays the bills.

"Thus we see an inter-relationship of responsibilities and privileges. The strength of this cord of cooperation will determine in large measure how well our campaign to promote electric home heating will succeed."

(*Continued on page* 80)

Why did the coal industry go so actively into electric heating?

Market studies conducted by the UMW's research and marketing department convinced them that electric home heating loomed large in coal's future.

While coal's share of the domestic space heating market shrank from over 100 million tons to 30 million tons in a short time, the amount of coal used by electric utilities jumped sharply. For example, between 1948 and 1959 the utility coal burned increased from 95,620,000 tons to 165,788,000 tons.

So began an intensive promotion of electric home heating by the coal industry.

It took the electric home heating industry to prove what every sensible polar bear has known all along—that a steady, well-distributed heat source surrounded by adequate insulation can provide great comfort under almost any condition, according to Fred H. Sides, executive officer of the National Mineral Wool Assn. That principle has been the overwhelming reason for the almost sudden success of electric house heating in all areas, he said.

This was not always so, however, he said. Originally man cut down his own heat loss by putting on heavy clothing, but the idea of putting a heavy coat around his house to be heated got off to a slow start. "The theory instead was that good strong walls were needed to ward off the winter weather, and a heating system should be able to provide enough heat no matter how cold it got inside the house."

Now proper insulation has changed all that, "and the comfort provided will be the reason that people will increasingly demand new offices and homes heated with electricity," Sides commented.

George Cline Smith, vice president and chief economist for F. W. Dodge Corp, characterized the outlook for the construction industry and particularly home building.

From here on it's a buyers' market, he said. "What the industry has to realize is that the postwar sellers' market in housing is over. Buyers will only take what they want, where they want it, and at financing that suits them."

Demand pressure for housing will remain high, according to Smith. Population growth and replacement needs indicate a basic annual demand for at least 1.3 million new units a year during the early 1960's and a higher level later.

Arthur Sworn Goldman, director of marketing at *House & Home* magazine, predicted that it is going to be tough sledding in selling the consumer on all-electric homes.

He said this is because there are still too many shoddy jobs which show electric heating is expensive. Fortunately, however, more and more utilities are doing their own policing, he noted.

But electric heat is young and really is just having the growing pains of any new industry, he said.

Medallion Home Has Potential

He saw potential for the Medallion Home, however, in the fact that today's market is not the cheap house but the quality house. The public is going to be dissatisfied with what they have and will want to buy better homes, he said.

Electric heating makes sense to the building industry because it is the most uncomplicated form of heating there is, was the opinion of Martin L. Bartling Jr, immediate past president of the National Assn of Home Builders and now assistant to the president of United States Gypsum Co.

He stressed the importance of a competitive rate. "You men in the utilities have the ability to come up with a competitive rate structure, and then you can control the heating industry in the country," he said.

The maximum heating rate should be no more than 1.5¢, however, he said. "Anything on down increases your competitive situation enormously." Get the rate to 1¢ and there is no reason why the utility can't be highly competitive.

Discussing electric heating equipment now on the market, Lowell R. Mast, director of engineering for the Electromode division of Commercial Controls Corp, said that those in electric heating must develop rules that protect the user. Electric heaters can be safer than the light people read by, he said.

The user is confused today, however, because of continued "nebulous and extravagant claims."

SMITH: Housing

Without widely accepted standards for its product, the electric heating industry is running the risk of gimmicks and gadgets of little value being sold to trusting consumers. Then the whole industry suffers.

Fortunately, standards are being prepared, though they will be modified, revised and added to, and "the industry must respect and adhere to these and other applicable standards," Mast commented.

"We have a good thing, let's take care of it properly."

The past, present, and future of electric heating was detailed by *Electrical World* Assistant Editor John D. Damon.

At last count the nation had 850,000 electrically heated homes, Damon said. But he noted that the competition is not standing still. According to a recent report by the Gas Appliance Manufacturers Assn, at the end of 1960 27,675,000 homes were heated with gas. This compares to 3,943,000 in 1940.

But electrically heated homes are increasing at an average rate of 21% a year, and were up 22% in 1960 over 1959. About 160,000 homes a year are installing or being converted to electric heat, he pointed out.

"Much of this movement must be credited to the utilities who have finally gotten behind electric house heating and are really digging in and pushing it.

"But the utility can't do it alone. It takes cooperation of everybody in the chain to keep it moving."

Up-rate distribution voltage with minimum service interruption with the

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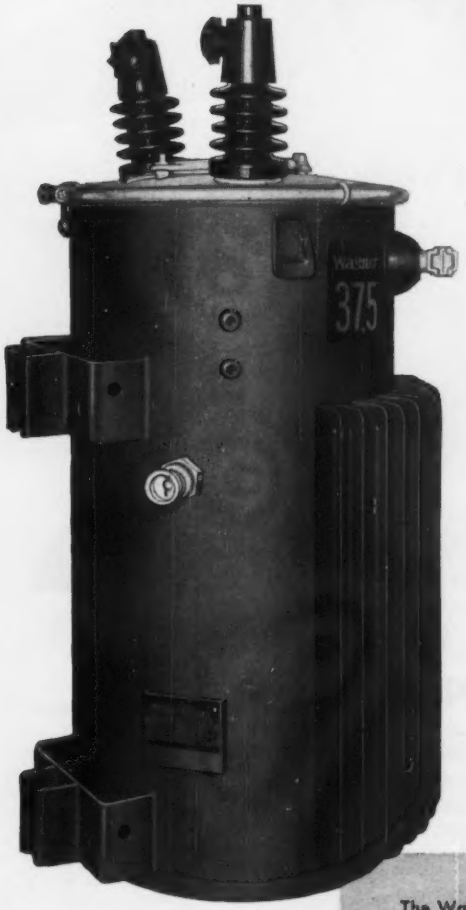

The switch is available on transformers with these high voltage ratings: 2400 X 7200, 2400 X 7620, 2400 X 7970, 4800 X 7620, 4800 X 14400, or 7200 X 14400. These dual-voltage units have losses and performance values comparable to single-voltage units of the higher voltage, and are insulated for the BIL of this voltage for positive protection against puncture, flashover or lightning failure.

For use on systems that will be uprated, Wagner can furnish 5 through 167 kva dual-voltage singlephase conventional transformers or 5 through 100 kva protected transformers equipped with a series multiple switch. The switch permits the uprating of an entire section of a distribution system at one time. The line need be de-energized for only the brief time necessary to change the switch to the higher primary voltage rating. The externally-mounted weatherproof cap is removed, reversed and used as a knob over the switch shaft to rotate the switch to the alternate position. Safety is positive; the knob cannot be removed unless the high conductivity switch contacts are in full operating position. It is not necessary to change the terminal board connections. The cover stays on . . . oil is not contaminated.

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SERIES POSITION

MULTIPLE POSITION

Fullerton Named Executive Vice President

Florida Power & Light Co has named R. C. Fullerton executive vice president.

A graduate of Cumberland University, Fullerton joined Florida P&L's Coral Gables office in 1930 and later became chief clerk there. He subsequently served as chief clerk at Miami Beach and then at the Miami office.

Fullerton became Florida P&L's director of customer service in 1942 and three years later was named assistant treasurer. Since 1950, he has been vice president in charge of personnel and customer service.

◀ R. C. FULLERTON

Cannon Becomes Washington Water Power Vice President

C. E. Cannon, chief engineer of Washington Water Power Co, has been elected a vice president.

A Washington State University graduate in hydroelectrical engineering, Cannon has been with Washington Water Power for 31 years. He started as an assistant engineer, later became an engineer, and in 1943 was named an electrical engineer.

He was promoted to chief electrical engineer in 1953 and chief engineer in 1958.

C. E. CANNON ▶

Lundberg Is Elected VP for Southern Nevada Power Co

Melvin E. Lundberg has been elected vice president and a director of Southern Nevada Power Co, and Elmer F. Johnson, vice president and assistant general manager, also became a director.

Lundberg will continue to be in charge of the company's operations in Elko, Nev. He had served for 20 years as general manager of Elko Lamoille Power Co prior to the recent merger of that northern Nevada utility into Southern Nevada Power.

Johnson, who has been in the utility business 33 years, has been with Southern Nevada Power since 1956.

Previously, Johnson's principal assignment was as head of American & Foreign Power Co's utility operations in Brazil.

◀ MELVIN E. LUNDBERG

(*More News About People on page* 84)

Strong Reasons

for specifying rigid conduit in STEEL

Proved Strength

Recent comparison tests indicate that Rigid Steel Conduit is up to ten times stronger than rigid conduit made from aluminum. Steel conduit provides these strength advantages:

—300 to 1000 pct *greater resistance to impact,* depending on the magnitude of the impact and the conduit size.

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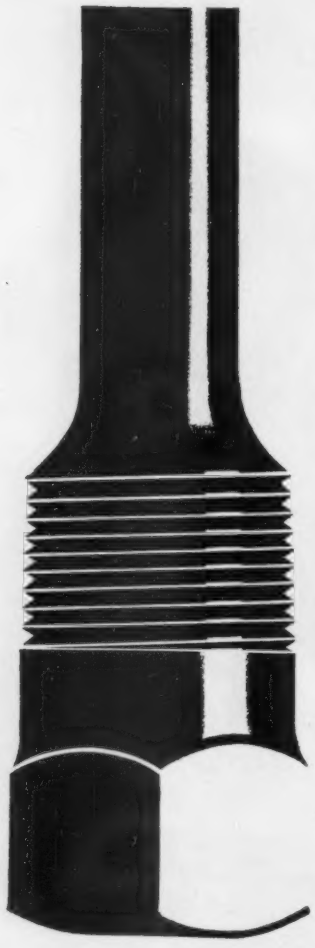

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PERSONAL BRIEFS

At Ohio Power Co, **E. E. Fournace** and **Harry O. Gray** were named assistants to the general manager; **E. A. Berry** was promoted to executive assistant and assistant secretary; and **John J. Sisler** became administrative assistant.

Central Power & Light Co in Texas has appointed **R. W. Smith** manager at Edcouch-Elsa, **Charles T. Machen** as Raymondville manager, and **Glenn Jones** as operations head in Mercedes.

Virginia Electric & Power Co has made **George F. Herrmann Jr** Chesterfield Station superintendent, replacing **Ralph C. Palmer** who retired. **Elmo M. Sweeney Jr** succeeded Herrmann as superintendent of the 12th Street Power Station.

Arizona Public Service Co has a new planning consultant: **Roger Ernst,** former assistant secretary of the Interior.

Southwestern Public Service Co's advertising manager, **Edward G. Weber,** has received the Advertising Federation of America/Printers' Ink Silver Medal Award.

Consolidated Edison Co has appointed **William J. Murphy** as general fuel agent, and **Atherton Thomas** as fuel agent.

Allan Rachles has been named executive secretary for the Indiana Public Service Commission.

Wayne L. Smith has been elected chairman of the Denver section of the American Institute of Electrical Engineers.

At Consumers Power Co, **Edward L. Karkau** has retired as district manager in Pontiac, southeast division.

At Dallas Power & Light Co, **Lewis F. Petersen** has retired as assistant treasurer, and **Annie Laura Davis** has retired as senior clerk in the purchasing department.

Robert P. Bailey has been named Duke Power Co's chief claim agent, succeeding **E. M. Smith** who retired. **J. A. Jones Jr** has become man-

ANNOUNCING

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—the most satisfactory pulling line available today!

* **GREAT STRENGTH**
(9,600 lbs. tensile for ¾" diam.)

* **LIGHT WEIGHT**
(11.7 lbs. per 100 ft., ¾" diam.)

* **HANDLES AND SPLICES LIKE MANILA**
in any climate or weather.

* **WATERPROOF,**
(even salt water) can't mildew; excellent dielectric properties.

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B-10

ager of Duke Power Co's transportation department; **J. Wesley Lewis,** manager of Durham district, replacing retired **Earl C. Dameron.**

Olin H. Broadway has been named assistant manager of district operations for Carolina Power & Light Co. The power company has also promoted **Richard S. Mallison** to secretary.

Niagara Mohawk Power Corp has assigned **Gerald K. Rhode** to its nuclear engineering staff.

Philip Sporn, president of American Electric Power Service Co, was presented with an honorary degree of doctor of technical sciences at a special convocation of the Technion Israel Institute of Technology March 8.

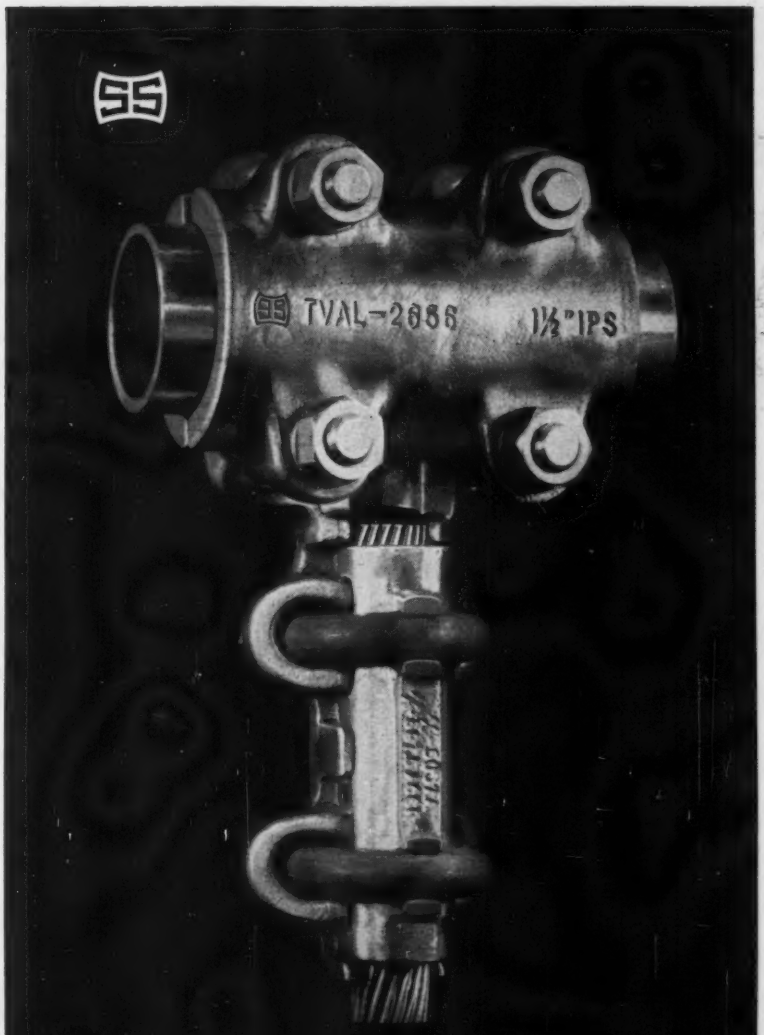
Hendon R. Johnston has become assistant chief construction engineer of Tennessee Valley Authority's construction division.

Middle West Service Co has appointed **Henry Williams Jr** resident manager of the Washington, D. C., office.

Abitibi Power & Paper Co, Ltd, has named **T. C. Anderson** project manager of the Toronto development and planning staff; **Gordon Sutton,** mill manager, Ft. Williams division; and **Harvey Turmaine,** mill manager, Thunder Bay division.

Allen E. Rotta has been appointed chief engineer of the Snohomish County PUD in Washington, succeeding **Donald F. Misz** who, because of illness, has had to reduce responsibilities.

Five employees of Bonneville Power Administration have received citations and special service awards for their contributions, as technical advisors, to the basic agreement between the US and Canada on Columbia River development. The five are **Morgan D. Dubrow,** manager of BPA's Washington, D.C., office; **Bernard Goldhammer,** commercial operations officer; **Henderson H. McIntyre,** hydraulics operation officer; **George C. Conner,** system planning section head; and **Chester E. Mohler,** general engineer.
(*More News About People, p* 86)



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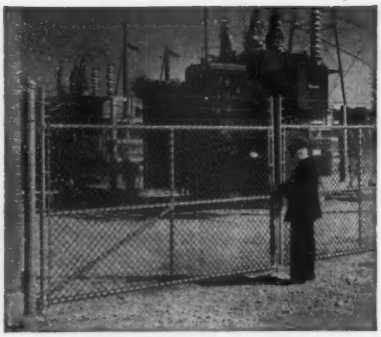

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When you write us, we'll send you the whole story in a helpful booklet, and the name of our nearest Member. Call him, he will gladly suggest the best answer to your property protection problem.

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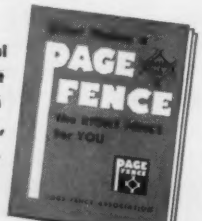

PAGE FENCE ASSOCIATION
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A product of Page Steel & Wire Division, American Chain & Cable Co., Inc.

Stanley B. Aronson, sales manager, Berko Electric Manufacturing Co, has been elected chairman of the electric house heating equipment section of the National Electrical Manufacturers Assn. In addition, **R. D. Graham** has been elected vice chairman. He is general manager, electric resistance comfort heating section, wiring devices department, General Electric Co.

Dean R. McKay has been elected a vice president of International Business Machines Corp. He will have staff supervision over personnel and communications.

P. T. Bloodsworth has been named eastern sales manager for Kaiser Steel Corp, with headquarters in New York City.

At McGraw-Edison Co, **Charles Edison** has retired as a director and chairman of the board. **Donald R. Long** has been named merchandise manager of the toastmaster division. And **Thomas P. Scanlon** has become a field engineer for Line Material Industries.

Radio Corp of America has appointed **D. L. Nettleton** chief engineer of the electronic data processing division, replacing **J. W. Leas** who became manager of the newly formed data communications and customs projects department. In Leas' new department, **John P. Macri** has become sales manager and **C. M. Breder** manager, operations control. **J. N. Marshall** has been named manager of advanced systems development engineering in the EDP division.

At Westinghouse Electric Corp, **W. J. Delaney Jr** has been named operations manager of the major appliance division; **Dr John C. R. Kelly Jr** was promoted to the newly created post of director, centralized technical services, of the central laboratories; **Russell J. Hurt Jr** became sales manager of service and modernization for the elevator division; **David L. Litten** was ap-

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BEATRICE NEBRASKA

pointed sales manager of the lighting division; **Joseph C. Belloni** became operations manager, distribution services department; and **L. C. Diekmann** was named director of manufacturing for the consumer products group.

Philco Corp has appointed **Louis J. Bruno** as government relations representative, Lansdale division.

At Allis-Chalmers Manufacturing Co, **W. E. I. Ellingen** has become sales manager; **R. A. Bernhardt,** chief engineer; and **R. A. Wilson,** consulting engineer. **S. M. Austin** was named manager of the water conditioning products section.

Minneapolis-Honeywell's electronic data processing division has made three appointments in its marketing division: **Robert A. DeWitt** to assistant to the marketing director; **Robert W. Blucke,** sales administration manager; and **Harold C. Wallace,** director of education, supervising the EDP division's customer and sales training programs.

Joseph L. Sturdevant has been named manager of commercial sales for Remington Rand's Univac division, Sperry Rand Corp.

Gail B. Hamilton Jr has been appointed manager of a new process automation sales operation at General Electric Co's industry control department. Also, General Electric Co's new manager of Hanford Works' electrical component which operates the atomic plant's distribution system is **C. M. Salina.**

Flintkote Co has elected **William L. Kauffman** controller, succeeding **Dennis J. McNamara** who recently retired.

OBITUARIES

Anson H. Rogers, 42, general service manager, electric lamp division, General Electric Co . . . **L. F. Chambers,** 69, former vice president, treasurer, and principal finance officer, Northern States Power Co . . . **Reuben L. Thornton,** 61, former Hollendale office manager, Mississippi Power & Light Co.

True . . .

photocontrols

are only

one part of

your system

. . . but they may be the *one* part that decides everything. All it takes to keep an otherwise perfectly good street lighting system in the dark (and someone on the carpet) is an "inexpensive", untried photocontrol someone has slapped together just so it would "sell". The worst of it is these "bargains" may work fine for a year or so, and then . . .

How are you fixed for links? Fisher-Pierce Division, Sigma Instruments, Inc., 82 Pearl St., So. Braintree 85, Mass.

FP

FISHER PIERCE

Electrical and Electronic Equipment for Industry, Utilities and the Home

T&D Group Argues Transformer Economics (*Continued from page 51*)

in the 1953-1955 report. By far the majority of the load (93%) is supplied by 3-phase networks, 4-wire, 120/208-v operating at a primary voltage of 10-15 kv.

Special network protector controls have now made it possible for Public Service Co of Colorado to provide 4-kv automatic feeder-transfer service at two network vault locations in Denver and guarantee a feeder transfer time of only 9 cycles. The installation serves two IBM RAMAC machines for processing airline flight reservations. Outages longer than 9 cycles shut the duplicate machines down and prevent restarting for 30 min. Because the machines process 60,000 reservations daily such a shutdown would result in a monumental ticket tangle. The machines are served by isolated two-feeder secondary networks. The special reclosing control of each network protector lets the installation work as a network as long as phase angle voltage between the feeders stays within the limits of the regulating transformers (installed between the network banks and their protectors) or until a protector is tripped. Once open, it acts as an automatic transfer mechanism for an interval and then becomes a network again. Reclosure on a dead or open feeder is prevented.

The 240/480-v underground distribution system for a total electric home development is now in construction near Annapolis, Md., on the system of the Baltimore Gas & Electric Co. The $40,000 to $50,000 homes in the development are equipped with appliances designed for 240-v-to-ground and provided with underground 240/480-v 3-wire service using 600-v, 75-C, rubber-insulated, Neoprene-jacketed cables buried in trenches provided by the developer, who also provides conduit systems and foundations for the 7,600-v pad-mounted transformers. Cost of these developer services is estimated at $220 per customer. Primary cable is No. 2 and No. 4 single-conductor 15-kv PILC cable that terminates in epoxy bushings in the transformer enclosures. Work on the system has been suspended with only one house completed, A. A. Smith, Baltimore G&E Co, said, "through no fault of the developer."

Engineering has changed radically since 1928 and the curriculum of engineering colleges has changed with it, Dr E. Reid Warren, University of Pennsylvania, told the Committee.

In the curriculum itself there has been a reduced emphasis on drawing, shop, physical education, and humanities and social sciences. Matching these cuts are an increased stress on physics, mathematics, engineering science and electrical theory. Mathematics courses are more advanced, entrance requirements higher than ever, Dr. Warren told the Committee.

Sterlington Computer Proves Savings and Reliability (*Continued from page 54*)

parts—that wear.

4. Held the computer speed to a conservative 50 kc.

To offset the corrosive effect of the Louisiana atmosphere, the specifications called for glass epoxyl printed circuit boards. To prevent noise and power dropout from affecting the computer's operation, batteries were floated across the transistorized power supplies. To protect against operator-caused trouble, such as connecting high voltage to low voltage signals, isolation relays were employed. In order to leave a large part of the system's computation ability available for the closed loop calculations that were added later, a magnetic core memory was used instead of the magnetic drum memory. This eliminated the need for minimum latency programming.

Because of these safeguards, the computer system itself developed no trouble. One result is that engineers feel that much backup and conventional instrumentation can be eliminated from future installations, thus reducing costs sharply.

Trim Up Distribution Pole Lines (*Continued from page 58*)

The company has experimented with cabling large service conductors to improve appearance. At one site, the building has a low, flat roof which required a mast for the service attachment. The four separate 4/0 copper conductors would have required a much longer mast, and proper support would have been difficult to obtain.

There have been several installations of 3-phase service in areas normally served by single-phase. The 3-phase voltage was brought in by adding a phase to a normal ridge-pin line, employing a post-type insulator on the side of the pole. The change was made chiefly to improve appearance. It avoids the crossarm look and cuts down materially on tree-trimming. The conductor used is bare ACSR.

The similar type construction was used where tree clearance was a problem. But polyethylene-insulated wire was used. "Triplex" secondary cable contributed to improved appearance.

The use of CSP transformers today eliminates bulky installation of cutouts and lightning arresters.

A new "flat-spun" triplex secondary cable was installed on a trial basis. The cable is spun at the factory with the conductors in a flat configuration. It noticeably improves appearance.

The transformer installation featuring the "secondary harness" which barely shows is accomplishing its aesthetic purpose. Its three secondary leads are bundled in the storeroom to form the harness appropriate for each transformer. Stores personnel assemble the harness from odd pieces of wire, and proper transformer leads are issued with the materials for the job. The construction forces cut one end to correct length and make up to the secondary.

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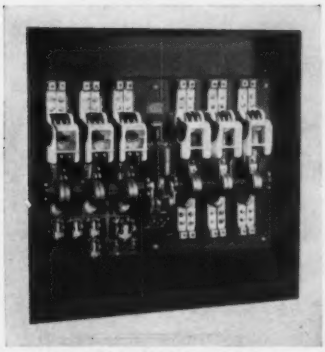

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By our method of reporting unemployment...

We're Giving The United States A Black Eye That Is Not Deserved

The way in which our unemployment is reported is giving the United States an undeserved black eye around the world. The broad concept of unemployment we use exaggerates the amount of unemployment in the United States as compared to most other countries. Our reporting system also falls short of presenting a balanced picture by concentrating on people who are idle, while neglecting jobs that are idle because people cannot be found to fill them. This editorial explains these defects and suggests improvements.

The *Monthly Bulletin of Statistics*, issued by the Statistical Office of the United Nations, has become a standard reference for international comparisons of economic performance, including employment and unemployment. Here, from the November, 1960 issue, is part of a table giving comparative figures on the rate of unemployment for the United States and a group of European countries:

	UNEMPLOYMENT RATE	
	Annual Average 1959	Jan.-June Average 1960
West Germany	2.4%	1.0%
Netherlands	1.8	1.4
Sweden	2.0	1.8
United Kingdom	2.3	1.9
United States	5.5	6.1

A Distorted Picture

If taken at face value the table clearly says that the United States is doing far worse in providing jobs for its citizens than the other countries whose unemployment records are listed.

But the figures are deceptive. They are made so, in part, by our government's use of a much broader concept of what constitutes unemployment than is used by most other countries.

Sweden provides a clear case in point. The table indicates that during 1959 Sweden had an unemployment rate of 2.0%, while the rate in the

United States was 5.5%. But a report from Sweden, published in the U.S. Department of Labor's *Labor Developments Abroad*, indicates that if they had used the same methods of calculating unemployment as we, the reported jobless rate in Sweden would have almost doubled. Thus a large portion of the gap between the unemployment rate in the United States and the unemployment rate in Sweden would have been eliminated.

Graduation To Unemployment

In general, countries listed in the table use registrations at public employment agencies as the basis for calculating their unemployment. Our Department of Labor, in making its sampling of unemployment, includes unregistered young people who are waiting for jobs or training opportunities as well as housewives who are looking for jobs in a general sort of way but who have not registered anywhere in search of them.

It used to be that graduation from college was regarded as a day for great celebration and rejoicing. But, because of the way the Labor Department does its counting of unemployment, it is now a day of sorrow. For unless our young people immediately rush off to jobs, they graduate into unemployment and swell our jobless figures.

While our government very expansively counts all the unemployed, there is no offsetting report on the number of jobs that are unfilled because no one qualified can be found to fill them. Currently there are many jobs in this category, and it is to be expected that there will be more as the technological revolution picks up momentum.

A properly balanced report on unemployment would include a record both of people who are idle, as conceived on some standard international basis, and jobs that are idle. A combination of the two sets of data would provide a much better indication of the economic health of a nation than unemployment alone.

The United Kingdom regularly collects figures on unfilled jobs as well as the number of unemployed. Thus it is not an impossible task to collect information on idle jobs. **For a fast moving economy, such as ours, the collection of statistics on unfilled jobs presents special difficulties. But this information is so important that Congress should see that it is added to our employment and unemployment records.**

A National Disservice

There is not the slightest inclination here to minimize the amount of unemployment in the United States at any time, or the crucial importance of doing everything possible to keep it at rock bottom. If the reporting of unemployment were simply for domestic consumption, it would be possible to make an appealing case for using a very broad conception of it. This is one way of underlining the importance of the problem.

But when, as is the case, international comparisons of unemployment are treated as key gauges of the effectiveness of different economies, we do ourselves an important national disservice by using an exceptionally commodious concept of unemployment. American travelers abroad can testify that they are continuously being called upon to explain why the United States does such a relatively poor job in providing employment for its people. This is an unwise and unfair burden to impose upon the nation. **We make enough mistakes of economic commission and omission without issuing reports that distort our economic performance to our own discredit abroad.**

This message was prepared by my staff associates as part of our company-wide effort to report on major new developments in American business and industry. Permission is freely extended to newspapers, groups or individuals to quote or reprint all or part of the text.

Donald C. McGraw

PRESIDENT

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6	750	Wagner	66,000Y—13,200
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1	5000	West.	34,500—13750/6875, 3 Ph.
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2	3000	Upgf.	34,750—4160, 3 Ph.
2	1500	G. E.	34,400—2520, 3 Ph.
3	1250	A. C.	33,000—480
4	750	Wagner	33,000Y—6900
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3	200	A. C.	34,500—2400/7200/12470Y
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1	600	Stand.	13,200—2300, 3 Ph.
1	450	Penna.	13,200—2400, 3 Ph. Askarel
4	667	Mol.	7,200—2400/4160Y
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4—1000 KVA Mol 7200/12470Y—4160
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National Association of Corrosion Engineers—Annual Conference, Statler Hotel, Buffalo, March 13-17.

Edison Electric Institute—Industrial Relations Committee, Mayflower Hotel, Washington, D. C., March 16-17; Meter and Service Committee, Netherland Hilton Hotel, Cincinnati, March 12-15; Sales Conference, Edgewater Beach Hotel, Chicago, March 20-21.

Tennessee Valley Public Power Association—Annual Meeting, Hotel Patten, Chattanooga, March 20-22.

Canadian Electrical Association—Western Zone, Empress Hotel, Victoria, B. C., March 20-23.

Institute of Radio Engineers—International Convention, Waldorf Astoria Hotel and the Coliseum, New York, N. Y., March 20-23.

Northwest Public Power Association—Meter School, Oregon State College Campus, Corvallis, Oreg., March 20-25.

American Power Conference—Sherman Hotel, Chicago, March 21-23.

Southeastern Electric Exchange — Annual Conference, Boca Raton Hotel, Boca Raton, March 27-29.

Symposium on Temperature—Sponsored by American Institute of Physics, Instrument Society of America, National Bureau of Standards, Columbus, March 27-31.

Electric Association of Kansas City—Fifth Biennial Electrical Supply Trade Show, Municipal Auditorium, Kansas City, Mo., March 28-30.

APRIL

The South Atlantic Wood Utility Pole Conference—Sponsored by the Wood Products Department of the School of Forestry, North Carolina State College, Raleigh, April 5-6.

Northwest Public Power Association — Annual Membership Meeting, Cascadian Hotel, Wenatchee, Washington, April 5-7.

Penelec 460-Kv Line to Collect Lightning Surge Data (*Continued from page* 56)

tests were made on small-scale geometrical models of the line at the GE high voltage laboratory. The model techniques provide for the prediction of lightning response of a given line as a function of lightning current wave shape and amplitude, footing resistance, and tower geometry. By means of the model line and simulated strokes to the line, the current distribution of a stroke to the ground wires was determined for the calibration of the transducers for the Line Surge Oscillograph. The statistical data on lightning strokes gathered from this investigation, as well as from other concurrent Project EHV investigations, when used with the model data, provide a means of determining lightning response by digital computer methods.

The summer of 1960 was spent in installing and debugging the instrumentation and making some initial tests. Two engineers will man the station full time for the next two summers.

The 460-kv prototype line affords an excellent opportunity to study properties of lightning and the manner in which an extra-high-voltage transmission line responds to lightning. An extensive investigation of lightning is being made on this experimental line to accumulate data on lightning current amplitudes and wave shapes, data needed in the electric utility field to improve the balance between reliability of transmission lines and system economy.

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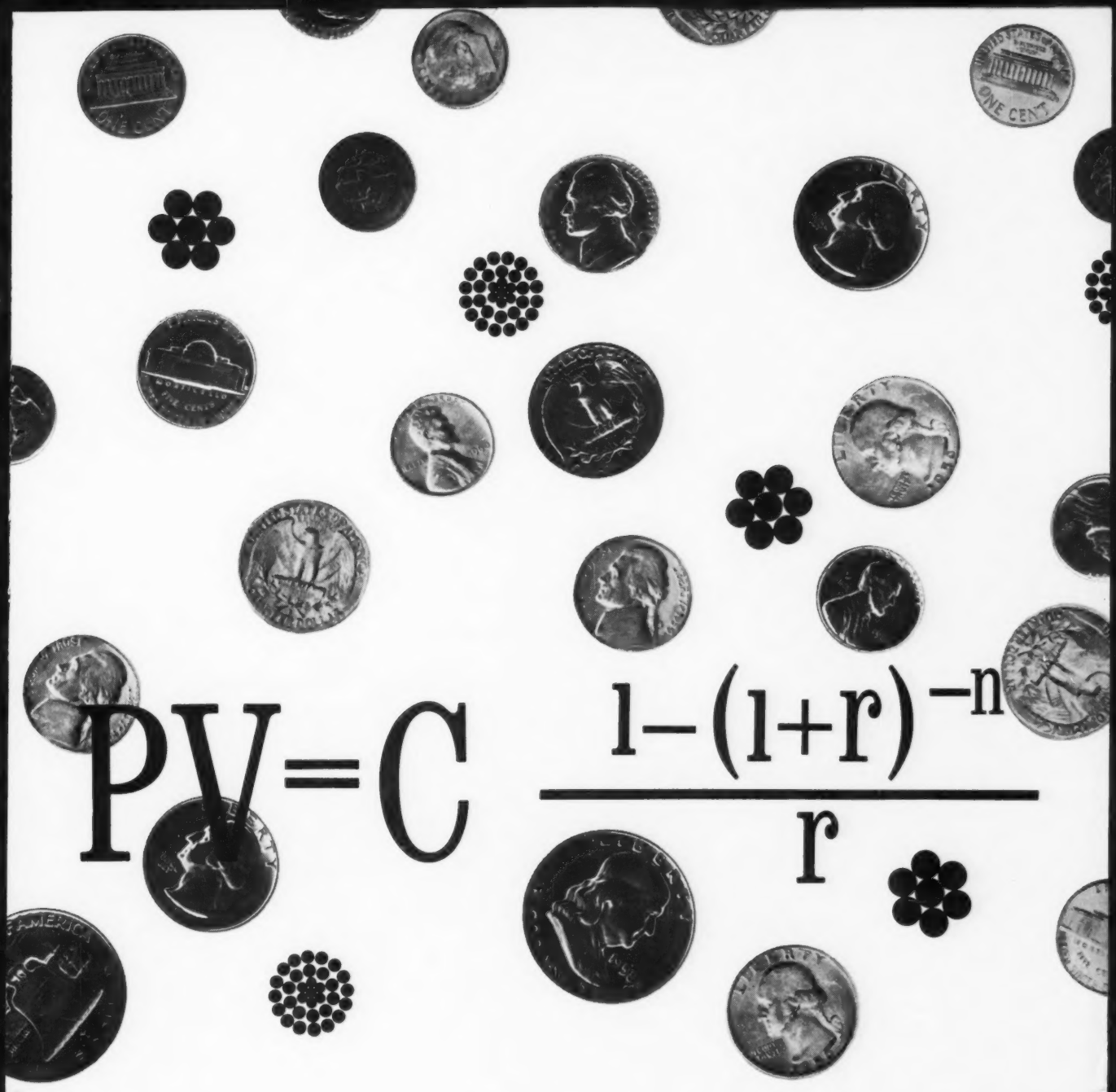

How important is 1% more conductivity?

It can save you up to $100 per mile of overhead conductor.

Compare two conductors—one with a conductivity of 61%, the other, Alcoa ACSR, with a 62% minimum guaranteed conductivity. Assume all other characteristics are equal. Now you can compute the dollar savings per conductor mile as a result of the extra 1%.

How much dollar savings? You can find the long-range answer, using the formula actuaries use to determine present value (PV) of benefits:

$$PV = C \frac{1-(1+r)^{-n}}{r}$$

where C = annual savings in dollars
n = amortization period in years
r = annual interest rate

You can see how important 1% more conductivity is over the life of a conductor. If you took these savings into consideration at the time of purchase, you could actually afford to spend up to 3 cents per pound more for an overhead conductor with a guaranteed 62% conductivity.

Alcoa gives you this important extra 1%—62% minimum guaranteed conductivity—at no increase in cost.

It's one of many *extras* you get when you use Alcoa ACSR and Alcoa overhead accessories.

Your nearby Alcoa-Rome salesman can help with all your overhead needs. For the name of our nearest representative, write to Rome Cable Division of Alcoa, Dept. 1-31, Rome, N. Y.

ALCOA
ROME CABLE
DIVISION

Double Protection for Pole-Type Transformers

❶ INSULATED "Quick-Grip" TERMINALS ❷ INSULATED "Celuclad" COVERS

Kuhlman pole-type transformers are fully protected by covered high voltage terminals and insulated covers against any possible service interruption caused by wildlife.

The unique protective design of Kuhlman "Quick-Grip" hand connectors prevents outside contact with all live parts. Thus birds and animals cannot short circuit across the two high voltage terminals or cause a line-to-ground short between terminals and the transformer cover. "Quick-Grip" also adds the convenience of simpler, easier line connections without the use of tools.

"CELUCLAD" COVERS ARE ADDITIONAL PROTECTION

As further protection, Kuhlman transformers are equipped with "Celuclad" insulated covers. The extra heavy "Celuclad" coating provides high dielectric strength and greater weather resistance. It is the same heavy-duty, corrosion-resistant finish furnished by Kuhlman for industrial and salt spray atmospheres.

Only Kuhlman offers the double protection of "Quick-Grip" and "Celuclad." Ask your Kuhlman representative about *all* the many extras which are standard on Kuhlman transformers this year.

KUHLMAN
TRANSFORMERS

KUHLMAN ELECTRIC COMPANY, Birmingham, Mich.

Manufacturers of transformers since 1894

FACTORIES: Bay City, Mich. • Crystal Springs, Miss. • Salinas, Calif.